APPENDIX H
IMPACTS ANALYSES OF CLOSURE AND REMEDIATION ACTIONS

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Appendix H presents project-specific analyses for three proposed projects related to closure and remediation that would occur within the timeframe under consideration in the *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico* (SWEIS):

- Technical Area (TA) 18 Closure, including remaining Operations Relocation, and Structure Decontamination, Decommissioning, and Demolition (DD&D);
- TA-21 Structure Decontamination, Decommissioning, and Demolition; and
- Waste Management Facilities Transition.

Each of these proposed projects would either: (1) generate potentially large volumes of wastes from exhumations or DD&D activities; or (2) require the installation of closure covers and subsequent long-term monitoring of areas at Los Alamos National Laboratory (LANL) where it is proposed that waste be left in place. Additionally, one project would also provide facilities necessary for the safe management of newly generated waste. The proposed timeframes associated with construction, DD&D, and closure activities for these projects are depicted in **Figure H–1**.

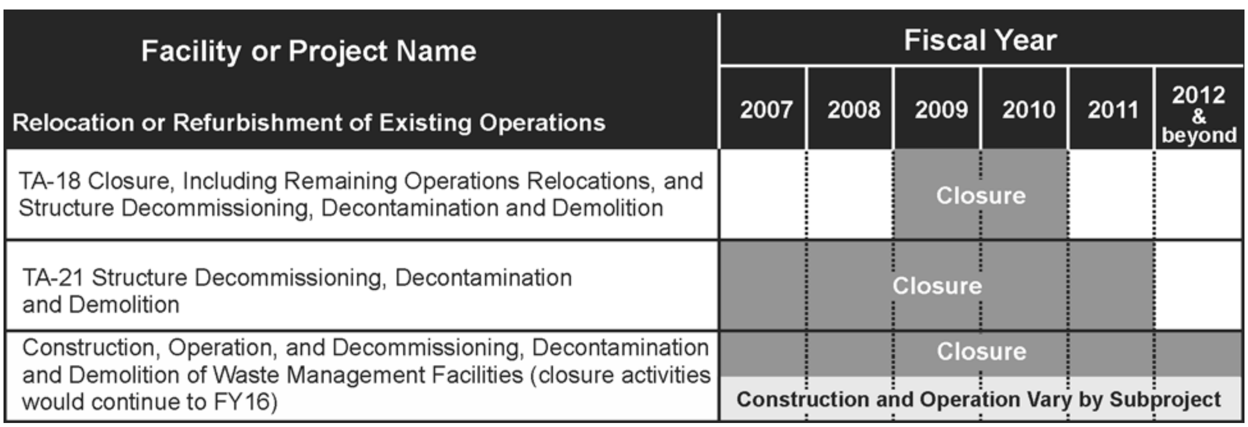

Figure H–1 Proposed Timeframes for Construction and Operation of Closure and Remediation Actions

DD&D activities are governed by a series of guidelines and procedures specified in U.S. Department of Energy (DOE) implementation guides DOE G-430.1-2, -3, -4, and -5, and by DOE-STD-1120-2005, that addresses integration of safety and health into disposition of facilities. LANL staff carefully plan all work to ensure compliance with established state and Federal laws and regulations (such as National Emissions Standards for Hazardous Air Pollutants [NESHAP]), DOE Orders, and Compliance Agreements, and in accordance with LANL procedures and best management practices. Depending on the project, LANL staff may choose to perform the DD&D work with site personnel or subcontract all or portions of the project. For the purpose of this description, both LANL and subcontractor personnel are considered DD&D workers. The National Nuclear Security Administration (NNSA) develops detailed project-specific work plans for the DD&D of structures before any actual work can begin.

Management and support activities associated with DD&D projects that parallel these elements include overall project management, DD&D work planning and engineering, characterization, authorization basis, radiological and safety technical support, waste and traffic management, cost and schedule management, program waste management planning, utilities and infrastructure management, and building surveillance and maintenance prior to and during DD&D. In particular, planning activities include preparation of implementation plans, safety documents, waste management plans, and procedures; engineering reviews and evaluations; readiness reviews and verification; and closure surveys and reports. LANL staff implement activity planning to support work control and worker safety using the Integrated Safety Management process, and limits exposure to workers based on an administrative control level of 500 millirem per year and as low as reasonably achievable (ALARA) principles.

Every DD&D project shares several common stages described in the following text box. The project-specific DD&D information related to each of the three proposed projects are detailed in subsequent sections of this appendix.

The ultimate disposition of the facilities constructed by the projects in this appendix would be considered at the end of their operations, usually several decades after their construction. The designs for the facilities that would support missions involving radioactive and hazardous materials are required to consider life-cycle features including eventual facility DD&D. It is anticipated that the impacts from the eventual disposition of the newly-constructed facilities would be similar or less than the impacts resulting from the disposition of the facilities that they replace.

Waste Management and Pollution Prevention Techniques. Waste management and pollution prevention techniques that could be implemented during the DD&D of the buildings and structures would include:

- Conducting routine briefings of workers.
- Segregating wastes at the point of generation to avoid mixing and cross-contamination.
- Decontaminating and reusing equipment and supplies.
- Removing surface contamination from items before discarding.
- Avoiding use of organic solvents during decontamination.
- Using drip, spray, squirt bottles or portable tanks for decontamination rinses.
- Using impermeable materials such as plastic liners or mats and drip pallets to prevent the spread of contamination.

Decommission, Decontamination and Demolition Work Elements

Deactivation (a preliminary step to DD&D): Materials and equipment to be reused would be relocated, and accountable materials would be collected and transferred to other locations for storage. Additional actions could be draining liquids from tanks and removing high levels of contamination. The structure may be placed in a surveillance and maintenance status. After deactivation, the structure may undergo DD&D or reused.

Removal of Process Equipment (a preliminary step to DD&D): Equipment would be cut up or removed. This may include ventilation systems and process lines. The process equipment would either be reused or packaged for disposal.

Characterization, Segregation of Work Areas, and Structural Evaluation: Walls, floors, ceilings, roof, equipment, ductwork, plumbing and other components within each building and site element would be tested to determine the type and extent of contamination present. The buildings and structures would then be segregated into areas of contamination and no contamination. Contaminated areas would be further subdivided by the type of contamination: radioactive materials, hazardous materials, toxic materials including asbestos, and any other Resource Conservation and Recovery Act listed or characteristic contamination. As part of the characterization and segregation of work areas, consideration would also be given to the structural integrity. Some areas could require demolition work prior to decontamination.

Removal of Contamination: Workers would remove or stabilize contamination according to the type and condition of materials. If the surface of a floor or wall were found to be contaminated, it might be physically stripped off. If contamination were found within a wall, a surface coating might be applied to keep the wall from releasing contaminated dust during dismantlement and to keep the surface intact.

Demolition of the Structures, Foundation, and Parking Lot: After contaminated materials have been removed, wherever possible and practical, the demolition of all or portions of the structure would begin. Demolition could involve simply knocking down the structure and breaking up any large pieces. Knocking down portions of the building, foundation, and parking lot could require the use of backhoes, front-end loaders, bulldozers, wrecking balls, shears, sledge and mechanized jack hammers, cutting torches, saws, and drills. If not contaminated, demolition material could be reused onsite at LANL or disposed of as construction waste onsite or offsite. Asphalt would be placed in containers and trucked to established storage sites within LANL, at TA-59 on Sigma Mesa.

Segregating, Packaging, and Transport of Debris: Demolition debris from the structures would be segregated and characterized by size, type of contamination, and ultimate disposition. Debris that is still radiologically contaminated would be segregated as low-level radioactive waste if no hazardous[1] contamination were present. Other types of debris that would be segregated include mixed low-level radioactive waste,[2] noncontaminated construction debris, and debris requiring special handling. Segregation activities could be conducted on a gross scale using heavy machinery or could be performed on a smaller scale using hand-held tools. Segregated waste would be packaged as appropriate and stored temporarily pending transport to an appropriate onsite or offsite disposal facility.

Debris would be packaged for transport and disposal according to waste type, characterization, ultimate disposition, and U.S. Department of Transportation (DOT) or DOE transportation requirements. Uncontaminated construction debris could be sent unpackaged to the local landfill by truck. Demolition debris would also be recycled or reused to the extent practicable. Debris would be disposed of either on or offsite depending on the available capacity of existing disposal facilities. Offsite disposal would involve greater transportation requirements depending on the type of waste, packaging, acceptance criteria, and location of the receiving facility.

Testing and Cleanup of Soil and Contouring and Seeding: The soils beneath the buildings would be sampled and tested for contamination. Any contaminated soil would undergo cleanup per applicable environmental regulations and permit requirements and would be packaged and transported to the appropriate disposal facility depending on the type and concentration of contamination. After clean fill and soil were brought to the site as needed, the site would be contoured. Contouring would be designed to minimize erosion and replicate or blend in with the surrounding environment. Subsequent seeding activities would use native plant seeds and the seeds of non-native cereal grains selected to hold the soil in place until native vegetation becomes stabilized.

[1] *Hazardous waste is a category of waste regulated under RCRA. Hazardous RCRA waste must be solid and exhibit at least one of four characteristics described in 40 Code of Federal Regulations (CFR) 261.20 through 40 CFR 261.24 (ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the U.S. Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.*

[2] *Mixed low-level radioactive waste contains both hazardous RCRA waste and source, special nuclear, or byproduct material subject to the Atomic Energy Act.*

- Avoiding areas of contamination until they are due for decontamination.
- Reducing waste volumes (by such methods as compaction).
- Engaging in the use of recycling actions (materials such as lead, scrap metals, and stainless steel could be recycled to the extent practical).

Some of the wastes generated from the DD&D of the buildings would be considered residual radioactive material. DOE Order 5400.5 establishes guidelines, procedures, and requirements to enable the reuse, recycling, or release of materials that are below established limits. Materials that are below these limits are acceptable for use without restrictions. The residual radioactive material that would be generated by DD&D would include uncontaminated concrete, soil, steel, lead, roofing material, wood, and fiberglass. The concrete material could be crushed and used as backfill at LANL. Soil could also be used as backfill or as topsoil cover, depending on its characteristics. Steel and lead could be stored and reused or recycled at LANL. Wood, fiberglass, and roofing materials would be disposed of at the Los Alamos County Landfill or other available landfill.

H.1 Technical Area 18 Closure, Including Remaining Operations Relocation, and Structure Decontamination, Decommissioning, and Demolition Impacts Assessment

This section provides an impacts assessment for the closure of TA-18, including the disposition of the remaining TA-18 Security Category III and IV capabilities and materials[1], a decision that was deferred in the Record of Decision (ROD) (67 *Federal Register* [FR] 79906) for the *Environmental Impact Statement for the Proposed Relocation of Technical Area 18 Capabilities and Materials at the Los Alamos National Laboratory* (DOE/EIS-0319) (*TA-18 Relocation EIS*), and the DD&D of the buildings and structures at TA-18. Section H.1.1 provides background information and the purpose and need for the relocation of TA-18 Security Category III and IV capabilities and materials, the proposed actions for the disposition of the remaining Security Category III and IV operations and materials, and DD&D activities. Section H.1.2 provides a brief description of the proposed options for the disposition of the remaining Security Category III and IV capabilities and materials. Section H.1.3 describes the affected environment and presents an impacts assessment for both the disposition of the remaining Security Category III and IV capabilities and materials, and for the DD&D of buildings at TA-18. Chapter 4 of this SWEIS presents a description of the affected environment at LANL and TA-18. Any unique characteristics of LANL and TA-18 not covered in Chapter 4 that would be affected by the proposed TA-18 closure, relocation of remaining TA-18 operations and subsequent DD&D of TA-18 buildings, are presented here.

H.1.1 Introduction and Purpose and Need for Agency Action

This section provides background information on the relocation of TA-18 Security Category I, II, III, and IV capabilities and materials, the proposed actions for the disposition of the remaining Security Category III and IV operations and materials, and DD&D activities.

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[1] *This Security Category description refers to the required level of safeguards and security as established in DOE Order 474.1A and its manual, DOE M474.1-1B.*

Background

NNSA is responsible for providing the Nation with nuclear weapons, ensuring the safety and reliability of those nuclear weapons, and supporting programs that reduce global nuclear proliferation (LANL 2005a). One of the major training facilities supporting these missions is located at TA-18. The principal TA-18 operation has been research in the design, development, construction, and application of nuclear criticality experiments. The operations at TA-18 enable DOE personnel to gain knowledge and expertise in advanced nuclear technologies that support the following: (1) nuclear materials management and criticality safety; (2) emergency response in support of counterterrorism activities; (3) safeguards and arms control in support of domestic and international programs to control excess nuclear materials; and (4) criticality experiments in support of Stockpile Stewardship and other programs.

The TA-18 buildings and infrastructure, some of which have been operational since 1946, range from 30 to more than 50 years of age and are increasingly expensive to maintain and operate. NNSA prepared an environmental impact statement (EIS) for relocating the TA-18 capabilities and materials in 2002. In its ROD (67 FR 79906) for the *TA-18 Relocation EIS*, NNSA decided to relocate Security Category I and II capabilities and related materials to the Device Assembly Facility at the Nevada Test Site (DOE 2002d). This alternative included transportation of special nuclear materials and equipment required to support Security Category I and II capabilities. NNSA did not issue a decision regarding the future location of TA-18 Security Category III and IV capabilities and materials within the LANL site, or the disposition of the TA-18 facilities.

TA-18 Interim Operations. Implementation of the ROD to relocate Security Category I and II capabilities and materials was initiated in 2004. In October 2005, TA-18 was de-inventoried below Security Category I and II levels. More than half of the programmatic special nuclear material was transported to the Device Assembly Facility at the Nevada Test Site. The remaining portion was transferred to TA-55 for temporary storage and excess special nuclear material sent to Y-12 disposition. The current planning assumptions for TA-18 operations are:

- TA-18 would continue to support limited Security Category III and IV capabilities through September 2008.
- TA-18 operations would cease at the end of September 2008, and the facility would be turned over for disposition.

During the 2005 through 2008 interim operations, the major programs using TA-18 facilities would be the Defense Nuclear Nonproliferation and the Nuclear Criticality Safety Programs. Defense Nuclear Nonproliferation Program elements include International Atomic Energy Agency and second line of defense training support. After 2006, the International Atomic Energy Agency training program would be performed at other LANL facilities. The Defense Nuclear Nonproliferation Program would continue to conduct experiments to support second line of defense and nuclear nonproliferation research and development testing at TA-18 until other locations within LANL become available.

After the removal of Security Category I and II equipment and material, the only critical assembly that remains operational at TA-18 would be the Solution High-Energy Burst Assembly (SHEBA) in its Security Category III configuration. The Nuclear Criticality Safety Program would continue to operate the SHEBA critical assembly to maintain the capabilities for training and criticality experiments. NNSA will analyze, through separate National Environmental Policy Act (NEPA) action, the relocation of SHEBA critical assembly from TA-18 to another site.

TA-18 has also been used to store sealed radiation sources returned to the NNSA under the Global Threat Reduction Initiative until they can be disposed of at the Waste Isolation Pilot Plant (WIPP) in New Mexico. LANL would continue to store radiation sources at TA-18, but over time would transition the staging to an area at TA-55 or other LANL locations (for example, at TA-54) for temporary storage pending disposition at WIPP.

NNSA plans to relocate some capabilities and materials from TA-18 to the Nonproliferation and International Security Center in TA-3, which currently houses personnel that support Defense Nuclear Nonproliferation Program activities. This facility can accept Security Category IV material.

TA-18 is located at the Pajarito Site and contains about 60 structures totaling about 80,000 square feet (7,432 square meters) (see **Figure H–2**). The main facilities consist of three remote-controlled Critical Assembly Storage Areas, or CASAs, (Buildings 23, 32, and 116) and a separate weatherproof shelter near Building 23 that houses SHEBA (Building 168). These buildings are located some distance from the main laboratory (Building 30) that houses individual control rooms for the remote-controlled critical assemblies.

SPECIAL NUCLEAR MATERIALS SAFEGUARDS AND SECURITY

(DOE Manual 474.1-1B)

Special nuclear materials are defined in the Atomic Energy Act of 1954 as (1) plutonium, uranium enriched in the isotope 233 or 235, or any other material designated as special nuclear material; or (2) any material artificially enriched by any of the above.

DOE's policy is to protect national security and the health and safety of DOE and contractor employees, the public, and the environment by protecting and controlling special nuclear material. This is accomplished by designing specific safeguards and security strategies to prevent or minimize both unauthorized access to special nuclear material and unauthorized disclosure, loss, destruction, modification, theft, compromise, or misuse of special nuclear material as a result of terrorism, sabotage, or events such as disasters and civil disorders.

DOE uses a cost-effective, graded approach to providing special nuclear material safeguards and security. Quantities of special nuclear material stored at each DOE site are categorized into security Categories I, II, III, and IV, with the greatest quantities included under Security Category I and lesser quantities included in descending order under Security Categories II through IV. Types and compositions of special nuclear material are further categorized by their "attractiveness," that is, the relative ease of the processing and handling activities required to convert such materials into a nuclear explosive device. For example, assembled weapons and test devices fall under Attractiveness Level A. Pure products (metal items that can be used for weapons production in their existing form or after simple mechanical processing) are categorized under Attractiveness Level B. High-grade special nuclear material (high-grade chemical compounds, mixtures, or metal alloys that require relatively little processing to convert them for weapons use) and low-grade special nuclear material (bulk and low-purity materials that require extensive or complex processing efforts to convert them to metal or high-grade form) are categorized as Levels C and D, respectively. All other special nuclear material (highly radioactive special nuclear material not included under another attractiveness level, solutions containing very small amounts of special nuclear material, uranium enriched to less than 20 percent uranium-235, etc.) fall under Level E. This alphanumeric system results in overall categories ranging from security Category IA (weapons and test devices in any quantities) to security Category IV (reportable quantities of special nuclear material not included in other categories).

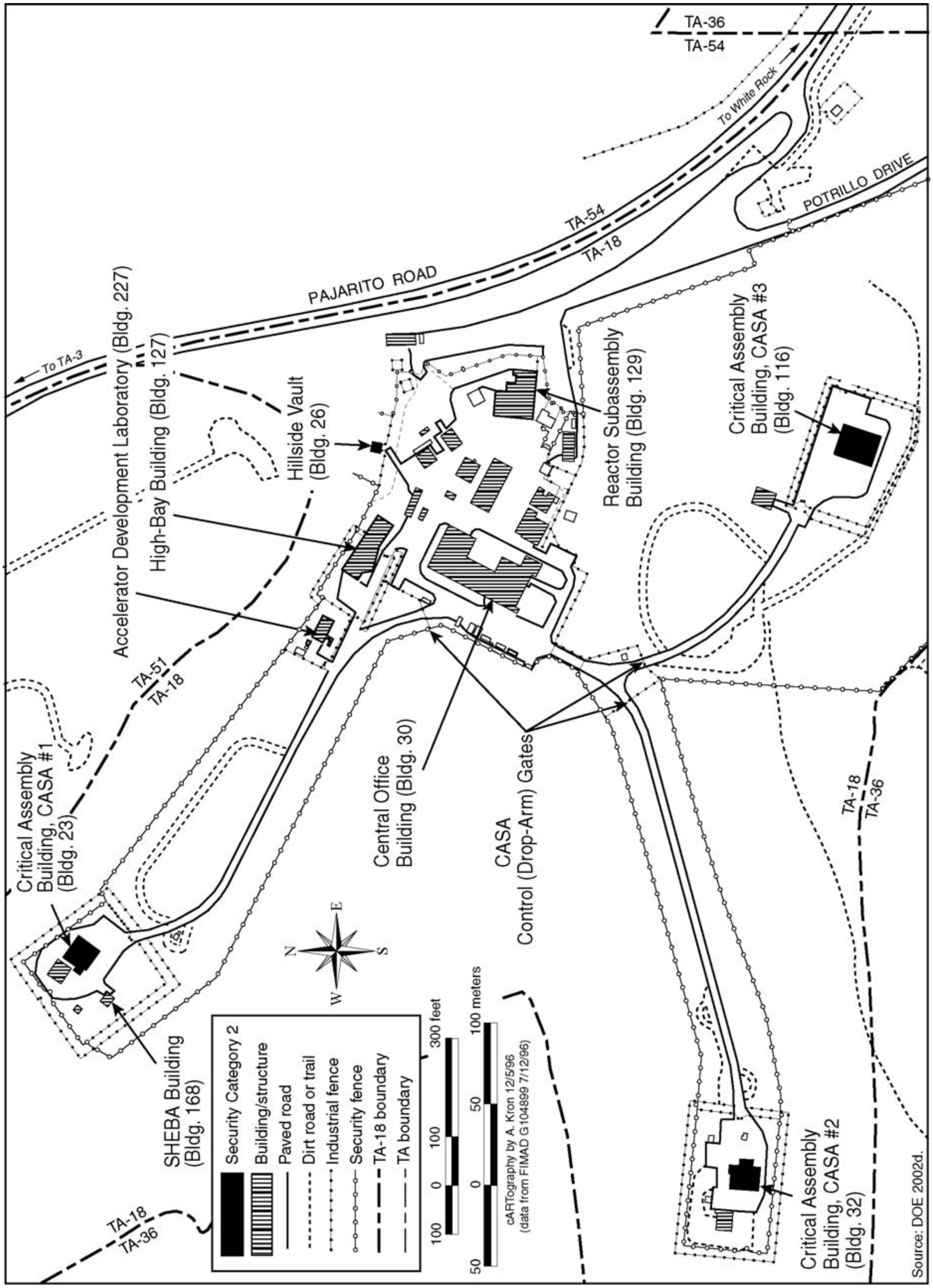

Figure H–2 Technical Area 18 Pajarito Site

A security fence surrounds each CASA. The following text describes the primary buildings being addressed in this project-specific analysis (DOE 2002d).

Building 23 (CASA 1)

CASA 1 was built in 1947. The CASA 1 experimental operations area is best described as cuboid. The interior dimensions are 30 feet (9.1 meters) wide by 48 feet (14.6 meters) long by 26 feet (7.9 meters) high. The walls of CASA 1 are constructed with standard hollow 8-inch (20.3-centimeter) by 8-inch (20.3-centimeter) by 46-inch (116.8-centimeter) concrete masonry blocks. The concrete masonry block walls are reinforced with 0.375-inch- (0.95-centimeter-) diameter reinforcing steel placed at 24 inches (61 centimeters) on center in both the vertical and horizontal directions. At a height of 16 feet (4.9 meters), the concrete blocks are replaced with glass block panels. These panels are constructed from regular 7.75-inch (19.7-centimeter) by 7.75-inch (19.7-centimeter) by 3.875-inch (9.84-centimeter) glass blocks. The west and east walls have one centrally located panel approximately 8 by 22 feet (2.4 by 6.7 meters), while the north and south wall each have three panels approximately 7.42 feet by 15.33 feet (2.3 meters by 4.7 meters). The roof is a 4-inch- (10.2-centimeter-) thick concrete slab. The floor is an 8-inch- (20.3-centimeter-) thick concrete slab with a 6-inch- (15.2-centimeter-) square reinforcing mesh of number 6 wires. The eastern wall has a 12 by 14 foot (3.7 by 4.3 meter) electrically operated ballistic-steel door.

In addition, four 3 foot (0.9 meter) by 7 foot (2.1 meter) personnel doors penetrate the CASA 1 experimental area walls (two in the south wall and one each in the east and west wall). CASA 1 houses general-purpose criticality experiment remote critical assembly machines. These machines do not contain permanently mounted nuclear fuel, and will remain in this building until relocation to the Device Assembly Facility at the Nevada Test Site.

Building 32 (CASA 2)

CASA 2 was built in 1952. It is a single-bay laboratory constructed of reinforced concrete walls and reinforced concrete slab and beam construction at the roof. The walls are 9 inches (22.9 centimeters) thick with a single mat of reinforcing, and 15 to 39 inches (38.1 to 99.1 centimeters) thick around the bay with double mat reinforcing. CASA 2 walls are like CASA 1 walls and afford only nominal shielding. The critical assemblies housed in CASA 2 are Flattop and Comet. These machines do not contain permanently mounted nuclear fuel, and will remain in this building until their relocation to the Device Assembly Facility at the Nevada Test Site.

Building 116 (CASA 3)

CASA 3 was built in 1962. It is a single-story structure with a high-bay laboratory. It has no windows, and no glass blocks were used in its construction. The main structure is constructed of reinforcing concrete shear walls and reinforced concrete slab and beam construction at the roof. Reinforced concrete masonry block walls surround the entrance, machine section, and equipment areas. CASA 3, with its 18-inch- (45.7-centimeter-) thick concrete walls and ceiling, is the only CASA that has significant shielding.

CASA 3 construction provides reasonable confinement in case of a relatively severe criticality accident. The one entrance to the main room is designed like a tunnel to minimize radiation scattering outside of the building, and it is oriented so that the entrance does not open toward the areas most frequently occupied by personnel or members of the public.

CASA 3 houses the Godiva critical assembly. This machine does not contain permanently mounted nuclear fuel, and will remain in this building until its relocation to the Device Assembly Facility at the Nevada Test Site.

Building 168 (SHEBA Building)

Located approximately 60 feet (18.3 meters) southwest of CASA 1 is the SHEBA Experiments Building 168. The building is an all metal double-wall construction with rigid frames anchored to a concrete pad. All walls and the ceiling are fiberglass insulated. For high-radiation experiments, SHEBA is lowered into a pit in the floor of the building which provides shielding during the experiments and provides containment of any liquid release from SHEBA. The current planning basis includes removal of SHEBA in 2009 and reconstituting it at another DOE Site by 2010.

The SHEBA Building provides only a weatherproof shelter for critical assemblies. No radiation shielding is provided by the structure. This is intentional, as radiation dose measurements and radiation instrumentation can be fielded around critical assemblies in the SHEBA Building without the presence of shielding or building scatter.

Building 30 (Central Office Building)

The main offices of the operating group are located in Building 30. These include the offices of the group management, staff, and several counting laboratories and electronic assembly areas. In addition, Building 30 houses the main TA-18 machine shop. The CASA 1, 2, and 3 control rooms are located on the south side of the building. Building 30 is a single-story building constructed of reinforced concrete with a basement.

Building 26 (Hillside Vault)

The Hillside Vault is located in the canyon wall at the northeast side of the TA-18 site. Materials and components are stored in sealed storage containers at designated locations. Containers are transported to other locations at TA-18 for use in experiments or radiation measurements. The vault is normally maintained to be free of detectable contamination and is subject to a very low occupancy factor.

Building 127 (High Bay)

Building 127, also known as the High Bay, is located next to the canyon wall at the north side of the site. It consists of a large room and a basement with an office complex. The experimental bay features a false floor and light walls to provide low scatter. This feature led to the use of the facility for measurements that require a "clean" radiation environment. A two-story-high shield wall separates the experimental bay from the rest of the site.

Activities on the main floor include portable radiography and detector development for passive and active surveillance of fissile material. There is currently a linear accelerator as well as a Kaman neutron generator in the basement. Both the linear accelerator and the neutron generator are connected to a scram system and a series of interlocks that allow their operation from the main-floor control room.

Building 127 can be used as a Material Access Area so that up to Security Category I quantities of special nuclear material can be temporarily brought into the building for experiments.

Building 129 (Reactor Subassembly Building)

Building 129 is located at the northeast end of the site. It is a concrete structure in which portal monitors and detection systems are developed and tested. It consists of one large room and several compartmentalized office and laboratory spaces. Both neutron and gamma-ray sources are used for detector development and calibration procedures. Fissionable material in Building 129 is limited to Security Category III special nuclear material.

Building 227 (Accelerator Development Laboratory)

Radiography operations are conducted in Building 227. Building 227, the Accelerator Development Laboratory, is a concrete structure housing a radiofrequency quadruple accelerator in the main level and a tomographic gamma scanner and a radioactive waste drum counter in the basement. Both of these devices use small sources (the tomographic gamma scanner uses cesium and barium sources and the drum counter uses a shielded pulsed neutron generator), or up to Security Category III special nuclear material inserted in matrices inside the drums to be used. A shielded control room is situated in the basement adjoining the laboratory space. The shielding is provided by a combination of both concrete and earth.

Purpose and Need

The purpose of this project is to remove all operations from TA-18 for security and safety reasons, primarily because it is located at the bottom of a canyon. The NNSA must make a decision regarding the future location of TA-18 Security Category III and IV capabilities and materials.

Consistent with its decision to relocate the Security Category I and II materials and operations to the Nevada Test Site or another site, NNSA plans to close TA-18 and relocate associated Security Category III and IV mission operations elsewhere at LANL. Therefore, NNSA needs to identify a suitable location, or locations, for relocating the remaining TA-18 capabilities and materials. In conjunction with that action, NNSA also needs to DD&D TA-18 facilities and disposition surplus Category III and IV materials.

H.1.2 Options Description

This section provides a description of the options for the disposition of the remaining Security Category III and IV capabilities and materials. It also identifies potential disposition options for TA-18 facilities.

H.1.2.1 Disposition of Remaining Security Category III and IV

The following summarizes the options considered for the disposition of the remaining Security Category III and IV capabilities and materials:

Option 1. Relocate the capabilities and materials within LANL. This option would have three approaches to accommodate the capabilities and materials:
Option A) construct a new facility at TA-55; Option B) construct a new facility elsewhere at LANL (for example at TA-48); or Option C) distribute the activities among selected facilities.

Option 2. Relocate, or reconstitute, the capabilities and materials at a site other than LANL. This option would have two approaches: Option A) relocate the capabilities and materials to a facility near the Device Assembly Facility at the Nevada Test Site; or Option B) relocate to other facilities at another DOE site.

Option 3. Keep the capabilities and materials at TA-18. This option is encompassed by the No Action Alternative, and would continue to use some TA-18 buildings and structures.

The *TA-18 Relocation EIS* considered and evaluated the consequences of constructing new facilities and relocating Security Category III and IV capabilities and materials to other locations within LANL. The consequences, as presented in the *TA-18 Relocation EIS*, would envelop those associated with the activities for Options 1a and 1c, and for Option 3. Option 1b is being considered as part of an integrated Radiological Sciences Institute Project and is evaluated in Appendix G, Section G.3, of this SWEIS. Options 2a and 2b would reconstitute the operation at locations offsite to LANL and therefore are not evaluated in this SWEIS.

NNSA is routinely exchanging and transferring equipment and materials between the various TAs. Therefore, transferring some of the Security Category IV materials to the Nonproliferation and International Security Center or TA-35 is considered to be part of the requirements for the normal operation and would not require any project-specific NEPA documentation. Both of these facilities are authorized to accept, store, and handle special nuclear material Security Category IV materials. Movements of Security Category III and IV materials between TA-18 and TA-55 are also considered routine operations activities at LANL.

The impacts of keeping the capabilities and materials at TA-18 within LANL would be similar to, or smaller than, those evaluated in Chapter 5 of this SWEIS under the No Action Alternative.

H.1.2.2 Disposition of Technical Area 18 Facilities

Disposition options considered for the TA-18 building and structures include:

Option 1. DD&D all building and structures;

Option 2. Continue to use some buildings and structures for continued operation of Security Category III and IV activities; and

Option 3. No Action, (no DD&D), keep the buildings and structures for other uses.

Over the past 60 years of operations, certain areas within some of the buildings and structures at TA-18 have become contaminated with radioactive material. At this time, the existing structures have not been completely characterized with regard to types and locations of contamination. In addition, project-specific work plans have not been prepared that would define the actual methods, timing, or workforce to be used for the DD&D of the structures.

The general processes that would be used to DD&D the structures at TA-18 would be the same as those described in the introduction of Appendix H. The contaminated areas within the TA-18 buildings comprise about 500 square feet (46 meters) (DOE 2002d). There are also small amounts of activation products in the concrete and metals within the walls of the critical assembly structures. Some of the disposition work could involve technologies and equipment that have been used in similar operations, and some could use newly developed technologies and equipment.

All demolition debris would be sent to disposal locations onsite or offsite. Demolition of the uncontaminated structures would be performed using standard industry practices. The TA-18 structures are not expected to be technically difficult to demolish and waste debris would be handled, transported, and disposed of in accordance with standard LANL procedures. A post-demolition site survey would be performed in accordance with the requirements of the MARSSIM (MARSSIM 2000).

H.1.3 Affected Environment and Environmental Consequences

The following discussions present the potential environmental consequences from: (1) disposition of the remaining Security Category III and IV and capabilities and materials; and (2) disposition of TA-18 buildings and structures. Detailed information about the LANL affected environment is presented in the main body of the SWEIS. An initial assessment of the potential impacts of the proposed project identified resource areas for which there would be no or only negligible environmental impacts. Consequently, for the following resource areas, a determination was made that no further analysis was necessary: environmental justice, socioeconomics, and infrastructure.

H.1.3.1 Disposition of Remaining Security Category III and IV Capabilities and Materials

The environmental consequences of Security Category III and IV activities under Option 3 (No Action) are similar to, or bounded by, those associated with the current activities at TA-18. Option 3 is incorporated into the No Action Alternative described in Chapter 3. Both this SWEIS and the *TA-18 Relocation EIS* provide the bounding consequences associated with the No Action Alternative. Relocation of the Security Category III and IV capabilities and materials to a facility near the Device Assembly Facility at the Nevada Test Site under Option 2 could provide a synergy between these capabilities and the Security Category I and II missions being relocated to the Nevada Test Site. NNSA is also considering relocating, or reconstituting, the

SHEBA critical assembly to another DOE site. These actions, as well as the option of relocating Security Category III and IV capabilities and materials to another DOE site, would result in environmental consequences outside the LANL site and are therefore not evaluated in this SWEIS.

The environmental consequences of actions under Options 1a or 1c, would be similar to, or bounded by, the consequences of relocating Security Category III and IV capabilities and materials evaluated in the *TA-18 Relocation EIS*. That EIS evaluated the consequences of relocating Security Category III and IV capabilities and materials, except for the SHEBA, to a new facility south of TA-55. Under Option 1a, a similar building would need to be constructed in a comparable location, leading to similar environmental consequences. Under Option 1c, capabilities and materials would be distributed among selected facilities, including the Nonproliferation and International Security Center and TA-35 laboratories for Security Category IV missions and materials, and the Chemistry and Metallurgy Research and TA-55 facilities for Security Category III and IV capabilities. Acceptance of Security Category III and IV materials would require capabilities and materials with minimal or no modification to these facilities. The movement of materials between the building and technical areas is considered to be part of the routine, day-to-day, operations at LANL. Therefore, the environmental consequences of actions under Option 1c would be nil, or bounded by those of Option 1a. The environmental consequences of actions under Option 1b are currently being analyzed as part of the Radiological Sciences Complex at TA-48 (see Appendix G). The environmental consequences presented in Appendix G would present an enveloping impact for relocating the remaining Security Category III and IV operational capabilities. This is because the impacts presented in the *TA-18 Relocation EIS* for Security Category III and IV materials and capabilities included other capabilities that would not be present (such as SHEBA) at TA-48 or at LANL. Option 1 is incorporated into the Expanded Operations Alternative described in Chapter 3.

H.1.3.2 Disposition of Technical Area 18 Buildings and Structures

This section describes the potential environmental consequences of the disposition of TA-18 facilities. This evaluation is based on the use of general industry DD&D methods and known practices that could be used for TA-18 buildings and structures.

Under Option 1, all TA-18 structures and buildings would undergo DD&D. Under Option 2, the excess buildings and structures would undergo DD&D. Option 3 is the No Action Option for the DD&D process. For Option 3, the buildings and structures would either remain under surveillance and maintenance or would be occupied by other users. For the purposes of this analysis, only the potential impacts of Option 1 are discussed, because the activities associated with this option would have the greatest potential impacts, including generating the largest volume of waste materials, and therefore bound Options 2 and 3.

The environmental impacts from demolition of buildings and structures are discussed qualitatively for land resources, air quality and noise, ecological resources, cultural resources, and human health. Quantitative impacts are presented for waste generation and its transport to local and offsite disposal sites. For purposes of analysis, it was assumed that low-level radioactive waste could be disposed of onsite, or transported to offsite disposal facilities, such as a commercial facility in Utah. Disposition of industrial waste and uncontaminated materials could be performed onsite or sent to local landfills.

Land Resources

Land resources include land use and visual resources.

Land Use

Facilities at TA-18 are located on a 131-acre (53-hectare) site that is situated 3 miles (4.8 kilometers) from the nearest residential area, White Rock. Approximately 20 percent of the site has been developed. Site facilities are located at the bottom of a canyon near the confluence of Pajarito Canyon and Threemile Canyon. TA-18 structures include a main building, three outlying remote-controlled critical assembly buildings known as CASAs, and several smaller laboratory, nuclear material storage, and support buildings. A security fence to aid in physical safeguarding of special nuclear material bounds the entire site. The Cerro Grande Fire threatened structures at TA-18, however, no permanent buildings were damaged or destroyed (DOE 2002d).

The generalized land use categories within which TA-18 is located are depicted in Figure 4–4 and include the Nuclear Materials Research and Development and Reserve (LANL 2003a). According to the *Comprehensive Site Plan* for 2001, TA-18 falls within the Pajarito Corridor East Development Area (LANL 2001a). The Plan indicates that much of TA-18 (including all developed portions) is designated as a No Development Zone (Hazard).

DD&D Impacts—DD&D of TA-18 buildings and structures could result in an overall change in the land use designation of the area. Although not shown on future land use maps of the site (LANL 2003a), the Nuclear Materials Research and Development designation could be changed such that the entire area would be designated as Reserve. Since the area would not be redeveloped following DD&D, there would be no conflict with the Pajarito Corridor East Development Area designation of much of the site.

Visual Environment

Since surrounding canyon walls rise approximately 200 feet (61 meters) above the site, TA-18 is not visible from any offsite location (DOE 2002d).

DD&D Impacts—DD&D activities could have short-term adverse impacts on visual resources due to the presence of heavy equipment and an increase in dust. Since TA-18 is located on the bottom of the Pajarito Canyon and the surrounding canyon walls essentially mask the buildings, no offsite visual impacts are expected. Once buildings and structures are removed and the site restored, including grading and planting of native species, the canyon bottom would present a natural appearance and, given time, would blend with previously undisturbed portions of the TA.

Geology and Soils

DD&D of the TA-18 facilities would result in disturbance of approximately 6.7 acres (2.7 hectares) and excavation of approximately 223,000 cubic yards (170,000 cubic meters) of soil. Because the soil was previously disturbed for facility construction, there would be no impact to native LANL soils. If uncontaminated, the excavated soils would be stockpiled for use as backfill either at TA-18 or elsewhere at LANL. If the soil is to be stockpiled for longer than a few weeks, the stockpiles should be seeded or managed as appropriate to prevent erosion and loss of the resource. In addition, care would be taken to employ all necessary erosion control best management practices during and following DD&D to limit impact on soil resources adjacent to the building sites. If contaminated, the soil would be disposed of as appropriate.

Water Resources

TA-18 facilities use domestic and industrial water, but the effluent from these sources has been pumped to the TA-46 Sanitary Wastewater Systems Plant and the TA-50 Radioactive Liquid Waste Treatment Facility, as appropriate. There has been no effluent discharged from TA-18 directly to the environment. Water usage at TA-18 has not been metered, but is expected to be average for laboratory and office facilities. Stormwater from the TA-18 buildings, roads, and parking lots drains into or falls within Pajarito Canyon. There are no underground or above-ground fuel storage tanks at the facility (DOE 2002d).

Parts of TA-18 lie within the 100-year floodplain for Pajarito Canyon. The building that houses SHEBA is partially within the floodplain boundary, although that assembly is only located at the facility during experiments. After the Cerro Grande Fire, high volumes of stormwater flow were expected through Pajarito Canyon, so a flood retention structure and a steel diversion wall were constructed upstream of TA-18 to minimize the possibility of flooding. When the watershed that drains into Pajarito Canyon returns to more stable conditions, these structures may be removed (DOE 2002e).

DD&D Impacts—DD&D activities would have little or no effect on water use or resources. Water use would be transferred to the other locations at LANL where TA-18 operations would be relocated. Most structures at TA-18 would be removed, which would remove potential contamination sources from an area where they could possibly be flooded. This would include removal of the steel diversion wall installed after the Cerro Grande Fire. Although the possibility of floodwater mobilizing contaminants from the buildings is remote, complete removal of this potential contaminant source would protect surface water quality.

DD&D activities would not result in the disturbance of watercourses or generation of liquid effluents that would be released to the surrounding environment. A Stormwater Pollution Prevention Plan using best management practices, such as silt fences and hay bales, would be used during the DD&D project to ensure that fine particulates are not transported by stormwater into surface water channels in the Pajarito Canyon. Potable water use at the site would be limited to that necessary for equipment washdown, dust control, and sanitary facilities for workers. Impacts of DD&D activities on groundwater should be minimal, because surface water would be collected and properly disposed of.

Air Quality and Noise

Air Quality

Nonradiological air pollutant emissions from TA-18 include criteria pollutants from various small fuel-burning sources and toxic chemicals. Use of toxic pollutants has been reduced in recent years and, in 2003, chemical use was limited to propane (LANL 2004b). Actual emissions vary by year with the amounts of chemicals being used. The use of toxic chemicals at TA-18 has not been shown to have an adverse impact on air quality.

The primary radiological emissions from TA-18 Security Category III and IV activities would be the radioactive noble gas activation (argon-41) generated during SHEBA operations. After removal of the SHEBA critical assembly (in 2009), no gaseous radionuclide would be present or generated at TA-18.

DD&D Impacts—DD&D of the buildings and structures would result in emissions associated with vehicle and equipment exhausts, as well as radiological and particulate (dust) emissions from demolition activities. No discernible effects on air quality would be expected to result from this action.

No releases of gaseous radionuclides are anticipated from DD&D. DD&D would generate very small amounts of particulate air emissions (dust) from size reduction of metal and concrete within the buildings. The dust could include lead, asbestos, and a small amount of radionuclides, primarily radioactive cobalt-60 isotopes from activation. Any emissions of contaminated particulates would be reduced by the use of plastic draping and contaminant containment coupled with high-efficiency particulate air filters. The location of TA-18 in the canyon bottom limits the transport of, and promotes the deposition of, airborne particulates, thus reducing the concentration of airborne particulates at the site boundary.

Noise

Noise sources from TA-18 operations include heat ventilation and air conditioning equipment, and vehicles. Noise impacts on the public from the operations in this area are limited to employee and other traffic.

DD&D Impacts—Construction noise at LANL is common, and noise levels during demolition activities would be consistent with those typical of construction activities. As appropriate, workers would be required to wear hearing protection to avoid adverse effects on hearing. Noninvolved workers at the edges of the mesas above TA-18 could hear the activities below; however, the level of noise would not be distracting. Some wildlife species may avoid the immediate vicinity of TA-18 as demolition proceeds due to noise; however, any effects on wildlife resulting from noise associated with demolition activities would be temporary. Upon completion of DD&D, there would be a minor reduction in noise.

Ecological Resources

This section addresses the ecological setting (terrestrial resources, wetlands, aquatic resources, and protected and sensitive species) of TA-18. Ecological resources of LANL as a whole are described in Section 4.5 in this SWEIS, and the vegetation zones are depicted in Figure 4–25.

TA-18 is located in the Piñon (*Pinus edulis* Engelm.)-Juniper (*Juniperus monosperma* [Engelm.] Sarg.) Woodland vegetation zone, although Ponderosa Pine (*Pinus ponderosa* P. & C. Lawson) forest is present along north-facing canyon walls. Approximately 20 percent of the TA is developed. Due to the presence of security fencing, no large animals would be found within developed portions of TA-18 (DOE 2002d); however, elk (*Cerus elaphus*) have been seen within other parts of the TA. The more northwesterly portions of TA-18 were burned at a low or unburned severity level as a result of the Cerro Grande Fire. At this level, seed sources should remain viable (LANL 2000a).

There are no wetlands located within TA-18; however, nine wetlands have been delineated within Pajarito Canyon (TA-36) just to the east (Army Corps of Engineers 2005). These wetlands total 15.2 acres (6.2 hectares). Plants found within these wetlands include coyote willow (*Salix exigua* Nutt.), Baltic rush (*Juncus balticus* Wildl.), sedges (*Carex* spp.), common spike rush (*Eleocharis palustris* (L.) Roemer & Schultes), American speedwell (*Veronica americana* Schwein. ex Benth), and cattail (*Typha* spp,). There are no aquatic resources located within TA-18 (DOE 2002d).

TA-18 falls within portions of the Threemile Canyon and Pajarito Canyon Mexican spotted owl (*Strix occidentalis lucida*) Areas of Environmental Interest. However, none of the TA-18 structures are in core habitat, and only CASAs 1 and 2 are in buffer habitat for the Threemile Canyon Area of Environmental Interest. TA-18 does not fall within Areas of Environmental Interest for the bald eagle (*Haliaeetus leucocephalus*) or southwestern willow flycatcher (*Empidonax traillii extimus*) (LANL 2000b).

DD&D Impacts—All DD&D activities would take place within the previously fenced and developed area of TA-18 that contains little wildlife habitat. Wildlife in canyon lands adjacent to TA-18 could be intermittently disturbed by construction activity and noise during the demolition period when heavy equipment would be used to raze structures, remove building foundations and buried utilities, excavate contaminated soil, and transport wastes to disposal sites. Species most likely to be affected are those commonly associated with the Piñon-Juniper Woodland community within which TA-18 is located. Temporary noises generated from demolition activities should attenuate to below Habitat Management Plan limits (80 decibels [db]) within a short distance from the construction site. Due to the presence of wetlands downstream from TA-18, a Floodplain-Wetlands Assessment would need to be performed prior to DD&D activities taking place. Implementation of best management practices during the demolition phase would prevent potentially sediment-laden runoff from reaching the wetlands. Ultimately, the canyon habitat could be restored using native species (which would have a beneficial effect on area wildlife) if the site were not used for other LANL-related purposes.

The DD&D of buildings and structures at TA-18 has the potential to disturb the Mexican spotted owl due to excess noise or light. Direct loss of habitat would not occur, since all activities would take place within developed portions of the TA. However, if DD&D were to take place during the breeding season (March 1 through August 31), owls could be disturbed and surveys would need to be conducted to determine if owls were present. If none were found, there would be no restrictions on DD&D activities. However, if owls were present, restrictions could be implemented to ensure that noise and lighting limits were met (LANL 2000b). As noted above, TA-18 would undergo restoration following DD&D. The restoration of canyon habitat would benefit the Mexican spotted owl by creating additional habitat within the buffer zones of the Threemile Canyon Area of Environmental Interest.

Human Health

DD&D Impacts—The primary source of potential consequences to workers and members of the public would be associated with the release of radiological contaminants during the demolition process. The only radiological effect on noninvolved workers or members of the public would be from radiological particulate air emissions. Any emissions of contaminated particulates would be reduced by the use of plastic draping and contaminant containment coupled with high-efficiency particulate air filters. Contaminant releases of radioactive particulates from disposition activities are expected to be lower than releases from past TA-18 operations.

Because of their age, it is anticipated that the demolition of the TA-18 buildings and structures would involve removal of some asbestos-contaminated material. Removal of asbestos-contaminated material would be conducted according to existing asbestos management programs at LANL in compliance with strict asbestos abatement guidelines. Workers would be protected by personal protective equipment and other engineered and administrative controls, and no asbestos would likely be released that could be inhaled by members of the public.

DD&D is estimated to require 43,330 person-hours. The DOE and LANL limit for the annual worker exposure is 5 rem (10 *Code of Federal Regulations* [CFR] 835), with an administrative control level of 2 rem (DOE 1999d). The worker dose during DD&D would be less than that of normal operations, or less than 100 millirem per person, annually.

For nonradiological impacts, based on the expected DD&D labor hours and national construction safety statistics, the DD&D of the TA-18 structures could cause on the order of two recordable injuries. No construction fatalities would be expected. Potential impacts from hazardous and toxic chemicals would continue to be prevented through the use of administrative controls and equipment.

Cultural Resources

Archeological Resources and Historic Buildings and Structures. TA-18 contains three types of archaeological cultural resource sites that have been determined to be eligible for the National Register of Historic Places. These include approximately 40 cavates, a rock shelter, and a historic structure of the Homestead Period (the Ashley Pond cabin). All of these sites have been determined to be eligible for listing on the National Register of Historic Places. Extensive erosion and stormwater control efforts initiated after the Cerro Grande Fire have had beneficial effects on the historic Ashley Pond cabin. This structure was surrounded by concrete barriers and sandbags to prevent damage from debris carried by stormwater runoff. Construction of a flood retention structure upstream also provides the Ashley Pond cabin additional protection from flooding (DOE 2002d).

TA-18 contains 60 buildings and structures dating to the Manhattan Project through the early Cold War period. Three of these buildings have been identified as eligible for listing on the National Register of Historic Places, including the Slotin Building (TA-18-1) and two other buildings (TA-18-2 and TA-18-5).

DD&D Impacts—Three archaeological resources sites found at TA-18 (a rock shelter, a cavate complex, and the Ashley Pond cabin) have been determined to be eligible for listing on the National Register of Historic Places. These resources are currently protected from disturbance and would continue to be protected during DD&D; thus, there would be no impact to archaeological resources. Only three LANL-associated buildings within TA-18 have been identified as National Register of Historic Places-eligible. However, there are other potentially significant historic buildings within TA-18 that have yet to be assessed for National Register of Historic Places eligibility status. A formal eligibility assessment of these buildings must be conducted prior to any demolition activities. Additionally, prior to any demolition activities, DOE, in conjunction with the New Mexico State Historic Preservation Office, would implement documentation measures such as preparing a detailed report containing the history and description of the affected properties. These measures would be incorporated into a formal Memorandum of Agreement between DOE and the New Mexico Historic Preservation Division in order to resolve adverse effects to eligible properties. The Advisory Council on Historic Preservation would be notified of the Memorandum of Agreement and would have an opportunity to comment.

Traditional Cultural Properties. Consultations to identify Traditional Cultural Properties were conducted with 19 American Indian tribes and two Hispanic communities in connection with the preparation of the *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Los Alamos, New Mexico (1999 SWEIS)* (DOE 1999a). As noted in Section 4.8.3 of the *1999 SWEIS*, Traditional Cultural Properties are present throughout LANL and adjacent lands. While specific features or locations are not identified in order to protect such sites, no Traditional Cultural Properties would be expected within developed areas of TA-18.

DD&D Impacts—Impacts on Traditional Cultural Properties would not be expected since such resources do not occur within developed portions of TA-18. However, the removal of structures at the TA could have a positive impact on any such resources located nearby since the area would present a less disturbed appearance than is presently the case.

Waste Management

The total amount of waste generated from the disposition of the buildings and structures is estimated to be 21,774 cubic yards (16,647 cubic meters). This estimate does not include the amount of waste generated by the demolition of the parking lot or by soil removal. Waste types and quantities generated by removal of the structures would be within the capacity of existing waste management systems, and would not result in substantial impact to existing waste management disposal operations. **Table H–1** summarizes the waste types and volumes expected to be generated during demolition activities. About 21 percent of the waste produced during DD&D activities would be bulk low-level radioactive wastes, all of which could be transported offsite for disposal. For the purpose of analysis, this SWEIS evaluates both the onsite and offsite disposal options for low-level radioactive waste to ensure that the potential environmental consequences of potential waste management options have been bounded.

- **Option 1**. Under this option, NNSA would pursue offsite disposal of low-level radioactive waste resulting from DD&D of the buildings and structures including concrete, soil, steel, and personal protective equipment. Both the Nevada Test Site facilities for waste disposal and an existing commercial facility at Clive, Utah, have the capacity to accept the anticipated amount of these types of waste. Under this option, there would be little reduction of LANL's remaining low-level radioactive waste disposal capacity at TA-54 Area G.

- **Option 2**. Under this option for waste disposal, low-level radioactive waste would be disposed of onsite at LANL at TA-54 Area G. The current footprint is expected to be adequate for the amount of low-level radioactive waste that would be generated by these DD&D activities, but implementing this option would reduce the remaining capacity at Area G.

Table H–1 Estimated Waste Volumes (cubic yards)

Low Specific Activity Waste	*Mixed Low-Level Waste*	*Solid* [a]	*Hazardous*	*Asbestos*
4,624	5	17,055	36	54

[a] Includes construction, demolition, and sanitary waste.
Note: To convert waste volumes to cubic meters, multiply by 0.76456.

All other wastes generated by DD&D activities would be handled, managed, packaged, and disposed of in the same manner as the same wastes generated by other activities at LANL. Most mixed low-level radioactive waste generated at LANL is sent offsite to other DOE or commercial facilities for treatment and disposal. The estimated mixed low-level radioactive waste volume is small and could be handled and disposed of at LANL or transported offsite for disposal at a permitted facility.

Small amounts of hazardous waste would also be generated during DD&D activities. These wastes would be handled, packaged, and disposed of according to LANL's hazardous waste management program. This amount of waste is within the capacity of LANL's hazardous waste management and disposal program.

TA-18 uses lead shielding and beryllium metal in their experiments. These metals are expected to move with the experiments to new locations. It is expected that some of the materials would be categorized as excess inventory requiring disposal. If that is the case, the volume of this excess and potentially contaminated metal would be within the storage capacity at LANL, and would be managed and disposed of consistent with LANL's hazardous waste management and disposal program.

The generated solid waste could also be managed at LANL or could be transported to a local offsite landfill. For the purposes of analysis, it was assumed that these wastes would be disposed of at an offsite location.

DD&D would generate about 54 cubic yards (41 cubic meters) of nonradiological asbestos waste. This waste would be packaged according to applicable requirements and sent to the LANL asbestos transfer station for shipment offsite to a permitted asbestos disposal facility along with other asbestos waste generated at LANL. It is not expected that the anticipated amount of waste would be beyond the disposal capacity of existing disposal facilities.

Transportation

DD&D wastes would need to be transported to storage or disposal sites. These sites could be at LANL or an offsite location. Based upon this analysis, no excess fatal cancers are likely to result from this activity. Transportation has potential risks to workers and the public from incident-free transport, such as radiation exposure, as the waste packages are transported along the highways. There is also increased risk from traffic accidents (without release of radioactive material) and radiological accidents (in which radioactive material is released).

The effects from incident-free transportation of demolition wastes under both waste options for the worker population and the general public are presented as collective dose in person-rem resulting in excess latent cancer fatalities (LCFs) in **Table H–2**. Based on this table, the risk for development of excess LCFs is highest for workers and the public under the offsite disposition option. This is because the dose is proportional to the duration of transport, which in turn is proportional to travel distance. This would lead to a highest dose and risk from disposal at the Nevada Test Site, which is the farthest from TA-18.

Table H–2 Incident-Free Transportation Impacts – Technical Area 18 Decontamination, Decommissioning, and Demolition

Disposal Option	*Low-level Radioactive Waste Disposal Location*	*Crew*		*Public*	
		Collective Dose (person-rem)	*Risk (LCFs)*	*Collective Dose (person-rem)*	*Risk (LCFs)*
Onsite disposal	LANL TA-54	0.0009	5×10^{-7}	0.0002	1×10^{-7}
Offsite disposal	Nevada Test Site	0.38	2×10^{-4}	0.08	5×10^{-5}
	Commercial Facility	0.33	2×10^{-4}	0.07	4×10^{-5}

rem = roentgen equivalent man, LCF = latent cancer fatality, TA = technical area.

Accidents could occur in all phases of activities during DD&D, including onsite and offsite transportation, deactivation, disassembly, characterization, and packaging of waste for disposal. Once materials and equipment were removed, there would be no potential for any radiological accident release. Any potential for a radiological accident during equipment removal would be bounded by those of operational accidents analyzed in this SWEIS (see Chapter 5) and the *TA-18 Relocation EIS* (DOE 2002d). Two sets of accidents were analyzed: industrial and transportation accidents.

Two types of transportation accidents were evaluated: traffic-related accidents without release of radioactive wastes, and cargo-related accidents in which radioactive wastes would be released. Traffic accident risks were evaluated in terms of traffic fatalities, and the cargo or radiological accident risks were presented in terms of excess LCF from exposure to radioactive materials. The analysis assumed that all generated nonradiological wastes would be transported to offsite disposal facilities.

Table H–3 presents the impacts from traffic and radiological accidents. The results indicate that no traffic fatalities and no excess LCFs would likely occur from the activities during DD&D of TA-18.

Table H–3 Transportation Accident Impacts – Technical Area 18 Decontamination, Decommissioning, and Demolition

Low-level Radioactive Waste Disposal Location [a]	*Number of Shipments* [b]	*Distance Traveled (million kilometers)*	*Accident Risks*	
			Radiological (excess LCF)	*Traffic (fatalities)*
LANL TA-54	1,225	0.41	Not applicable [c]	0.0049
Nevada Test Site	1,225	1.1	4.8×10^{-8}	0.012
Commercial Facility	1,225	1.0	3.6×10^{-8}	0.011

LCF = latent cancer fatality, TA = technical area.
[a] All nonradiological wastes would be transported offsite.
[b] Only 22 percent of shipments are radioactive wastes, others include 77.5 percent for industrial and sanitary waste, and about 0.05 percent for asbestos and hazardous wastes.
[c] No traffic accident leading to releases of radioactivity for onsite transportation is hypothesized.
Note: To convert kilometers to miles, multiply by 0.621.

H.2 Technical Area 21 Structure Decontamination, Decommissioning, and Demolition Project Impact Assessment

This section provides information on the environmental effects of the proposed DD&D of TA-21 buildings at LANL. Section H.2.1 provides background information on TA-21 and its buildings, and describes the purpose and need for TA-21 DD&D, an action that would reduce ongoing surveillance and maintenance costs and allow investigation of solid waste management units[2] located beneath the buildings. Section H.2.2 provides a description of the options to address the TA-21 buildings. Section H.2.3 describes the affected environment at TA-21 and presents an impacts assessment for the options to DD&D, as well as the No Action Option. Chapter 4 of this SWEIS presents an overall description of the affected environment at LANL and TA-21. Any unique characteristics of LANL and TA-21 not covered in Chapter 4 that would be affected by the proposed DD&D of TA-21 buildings are presented here.

H.2.1 Introduction and Purpose and Need for Agency Action

The purpose of this project-specific analysis is to provide an assessment of impacts from the DD&D of TA-21 buildings and structures. This section provides background information on the DD&D activities, the purpose and need of the action, and a summary of related NEPA actions.

Background

TA-21 covers about 312 acres (126 hectares) at the northern portion of LANL adjacent to the Los Alamos Airport, principally on the DP Mesa. It contains a total of about 65 buildings and structures with a cumulative area of 239,000 square feet (22,200 square meters) (LANL 1999). The central area of TA-21 consists of groups of buildings and support facilities divided into two areas known as the DP West and DP East sites (sometimes collectively referred to as the "DP Site"). **Figure H–3** and **Figure H–4** show the locations of buildings and solid waste management units in DP West and DP East, respectively.

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[2] *"Solid waste management unit" means any discernible unit at which solid waste has been placed at any time, and from which the DOE determines there may be a risk of a release of hazardous waste or hazardous waste constituents, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at the facility at which solid wastes have been routinely and systematically released; they do not include one-time spills (NMED 2005a).*

The DP Site was built late in the Manhattan Project, in 1945, as the principal location for the LANL Plutonium Processing Facility. Buildings at DP West were used for plutonium recovery, precipitation, conversion, purification, reduction, metal casting and machining, and liquid radioactive waste treatment. Later, the buildings were converted for research on uranium hydride, enriched uranium fuel elements, and plutonium fuels service and development. During the 1970s, LANL transferred the process activities from DP West to facilities at TA-55, and removed the remaining process equipment. In 1996, large portions of two of the buildings, 21-0003 and 21-0004, were demolished.

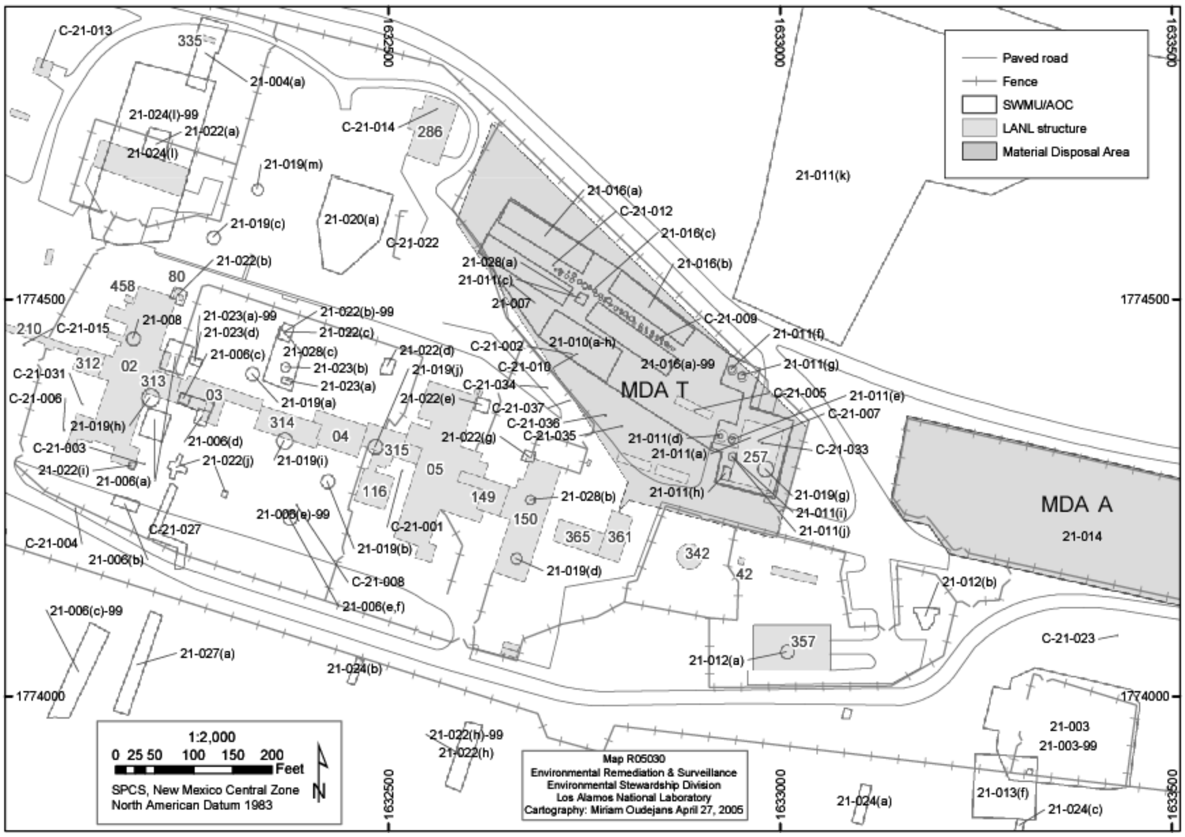

Figure H–3 Technical Area 21 Map of DP West Buildings and Solid Waste Management Units

The DP West buildings center on a core group of buildings running west to east: Buildings 21-0210, 21-0002, 21-0003, 21-0004, 21-0005, and 21-0150. Building 21-0210 is minimally contaminated and provides general office space. The remainder of these structures were process buildings designed for work with uranium and transuranic materials. The buildings have below-grade unlined concrete "troughs" that contain waste and process piping. The older buildings are pre-engineered steel frame metal lath and plaster buildings with metal exterior sidings and roofs. Buildings 21-0150 and 21-210 are concrete column construction with exterior walls of concrete masonry unit construction (LANL 1999).

Although most of the highly contaminated process equipment such as gloveboxes, glovebox ducts and filter plenums, and process tanks have been removed, small amounts of equipment such as fume hoods, waste tanks, sections of duct, and air filtration equipment remain. A small quantity of highly contaminated process piping remains, particularly in the troughs. This piping is likely contaminated with transuranic nuclides. The buildings are being operated at a minimum surveillance and maintenance level, involving only those actions that are necessary to prevent hazards to surveillance workers or environmental releases. In practice this means that the heat and ventilation services are shutdown and the lights, electrical power, and fire suppression systems remain active. Maintenance is insufficient to prevent slow deterioration of the structure

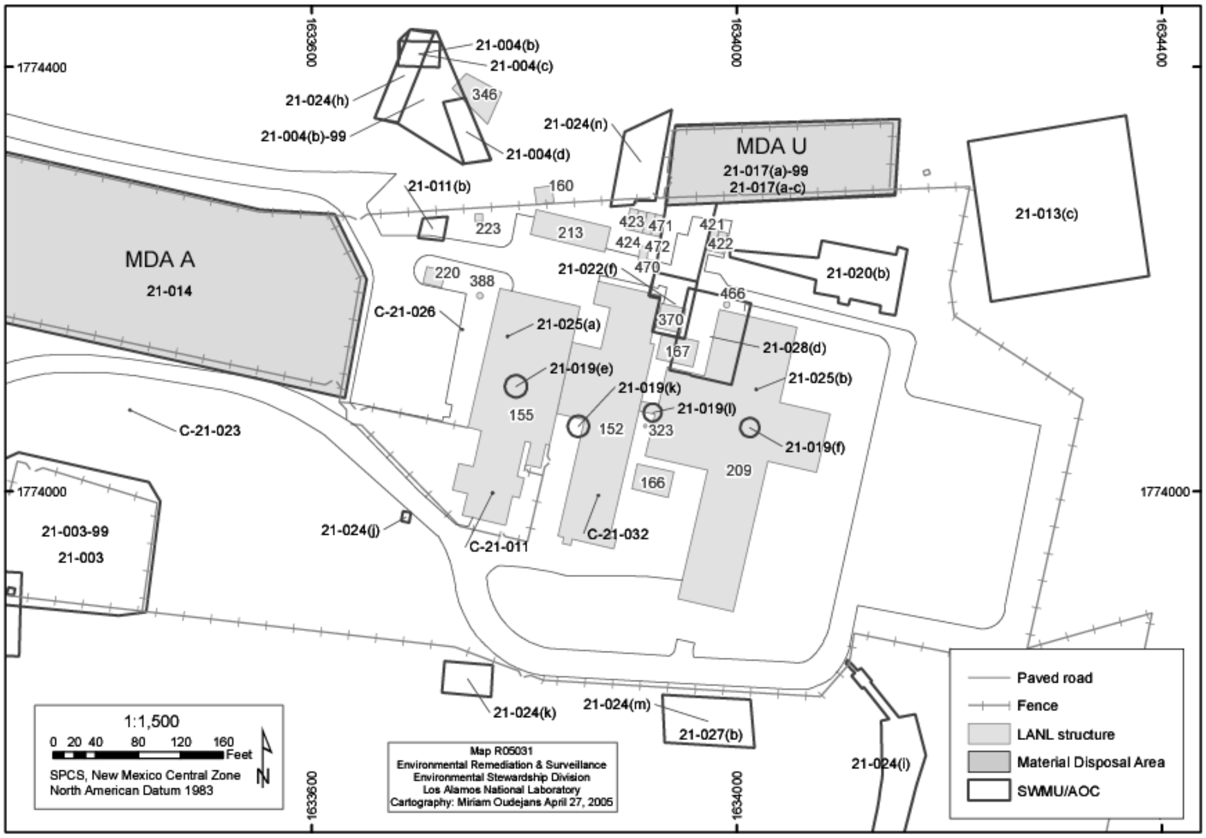

Figure H–4 Technical Area 21 Map of DP East Buildings and Solid Waste Management Units

and deterioration of protective coatings (paint) applied to contaminated building surfaces. NNSA maintains radiological and access controls for the buildings consistent with the presence of high levels of fixed contamination.[3] Previous DD&D projects demolished most of Buildings 21-0003 and 21-0004 in the 1990s, with the only portions remaining being the central corridor areas. A number of lesser structures directly supported the larger buildings, mostly by providing utility services and corridor access between buildings (LANL 1999).

Two other DP West buildings, 21-0257 and the 21-0286 slab, are located within or adjacent to material disposal area (MDA) T, and the DD&D approach for those structures would be closely coordinated with the remediation approach for that MDA. Building 21-0286 was a former storage vault and warehouse, and the slab is minimally contaminated. Building 21-0257, the TA-21 Liquid Radioactive Waste Treatment Facility, provides pretreatment of liquid radioactive wastes prior to their transfer to the TA-50 Liquid Radioactive Waste Treatment Facility for final

[3] *"Fixed contamination" refers to residual radioactive materials that are not easily removed from a surface. In many cases, the contamination may be "fixed" in place with paint.*

treatment. During 2001, the two-mile long, single-walled transfer line, dedicated to the transfer of radioactive liquid wastes from the TA-21 tritium facilities to the TA-50 Liquid Radioactive Waste Treatment Facility, was taken out of service, flushed, drained, and capped. The small volumes of liquid waste pretreated at the TA-21 Liquid Radioactive Waste Treatment Facility are now transported from TA-21 to TA-50 or TA-53 by truck for final treatment and disposal (LANL 2004d). Building 21-0257 would remain to support the deactivation of the DP East buildings, after which it would be deactivated. The disposition of any contaminated effluent piping would be addressed as an environmental remediation activity.

DP East buildings historically supported polonium and actinium initiator research and production, and research on coatings of reactor fuels for the Rover Program. Since 1977, the buildings have been used for tritium handling, processing, and storage to support the Tritium Key Facility tritium research and technology mission. The remainder of TA-21 surrounds the DP East and DP West sites and includes various infrastructure and support buildings and structures. **Figure H–5** provides an aerial view that shows DP East and DP West and their relationship to the western portion of TA-21 and the Los Alamos townsite.

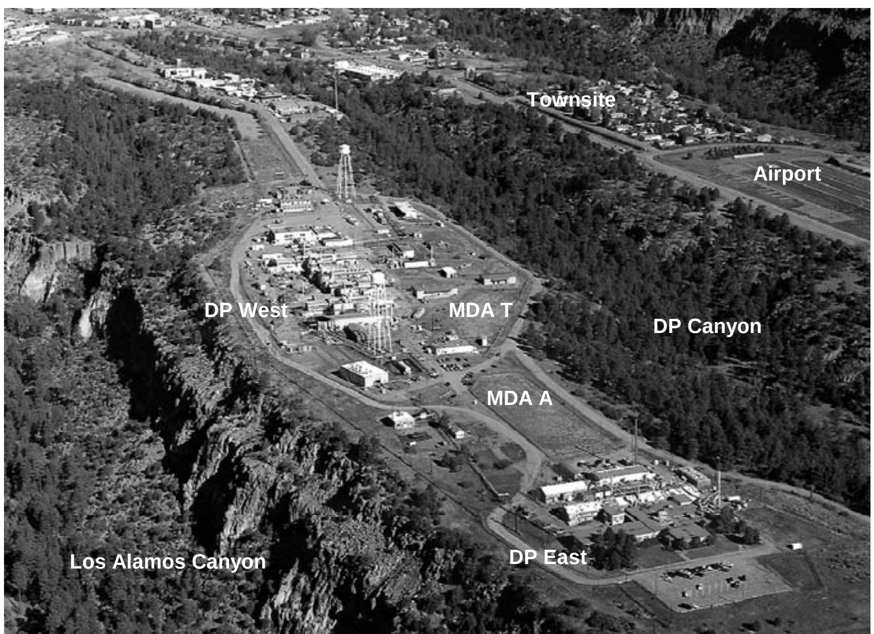

Figure H–5 Aerial Photograph of the DP East and DP West Sites, Looking West (1995)

The DP East process buildings are 21-0155, 21-0152, and 21-0209. Buildings 21-0155 and 21-0152, the Tritium Systems Test Assembly Buildings, were originally used for polonium-210 initiator research, and were converted for use in the tritium program starting in 1977. They are primarily production facilities with presses, furnaces, and tritium trapping equipment (LANL 1999). Beryllium was used in Building 21-0152 in conjunction with polonium for the Initiator Research Development Project. Building 21-209, the Tritium Science and Fabrication Facility, holds some process equipment, but also contains gloveboxes, laboratory equipment, change rooms, and administrative areas; it was never used for processing transuranic materials (LANL 1999). A number of support structures, the largest being Building 21-0166, 21-0167, 21-0213, and 21-0370, provide mechanical equipment, exhaust filtration, and warehouse support.

Building 21-0152 and portions of Building 21-0155 are 1945-era pre-engineered steel frame, metal lath and plaster buildings with metal exterior siding and roofs. Buildings 21-0155 and 21-0209 contain concrete columns with concrete masonry units and brick exterior walls, and built-up roofing (LANL 1999). The equipment in these two buildings contained accountable quantities of radioactive material that is assumed to be removed in the deactivation operations prior to DD&D.

LANL staff has essentially completed the transfer of the tritium handling and storage mission from the DP East process buildings, and are currently in the final stage of operation – building deactivation – although minor mission activities are scheduled to continue through 2006. After completion of building deactivation, LANL would place the buildings into a surveillance and maintenance status pending DD&D.

The remaining active TA-21 buildings are used for administrative or logistics support (such as general offices, warehouses and maintenance shops) or are facilities that support the overall DP Site. There are numerous inactive buildings and structures that are largely unused and awaiting DD&D. Particularly prominent items include two water towers and water supply pumps and equipment that support the domestic water system. There are a number of warehouse facilities, sludge drying beds adjacent to the now unused sewage treatment plant, a steam plant that supplies heat to process and office facilities within the TA-21 area, electrical substations, chemical tanks and piping, security buildings, and additional miscellaneous utilities. There are also other nonbuilding "structures" such as roads and parking lots, various types of fences and security systems, utility poles, light poles, steam lines, and other miscellaneous features (LANL 1999). A natural gas pipeline currently supplies the steam plant and furnace facilities of DP East and serves as a secondary supply of natural gas to TA-53.

Access to the TA-21 facilities is via DP Road, which connects with State Road 502 at the edge of the Los Alamos business district. Access from TA-21 to the remainder of the LANL facility is either west along State Road 502 (Trinity Drive) and Diamond Drive to TA-3, or east on State Road 502 to State Highway 4. The route east on State Road 502 is steep and curved and not recommended for truck traffic.

The Consent Order issued on March 1, 2005, establishes requirements for the investigation and cleanup of environmental contamination at LANL (NMED 2005a). TA-21 contains five MDAs, and over 60 potential release sites, many related to TA-21 buildings. For example, the Liquid Radioactive Waste Treatment Facility in 21-0257 contains many treatment and holding tanks that are designated as solid waste management units under the Consent Order and is included in the area specified for MDA T corrective action. The process buildings were originally constructed with below-grade waste piping contained in concrete troughs; these troughs are being investigated as potential release sites. There are additional known or suspected contaminant release sites next to or underneath the process buildings that are subject to investigation and corrective actions as part of the NNSA response to the Consent Order.

To allow a thorough and complete investigation of existing TA-21 solid waste management units and potential release sites, NNSA would remove a number of the larger remaining TA-21 structures to allow reasonable access to nearby solid waste management units and areas that are currently obstructed. Utility infrastructure also would need to be removed to allow access to additional areas. Schedules and activities for investigating each impacted solid waste management unit would need to be integrated with the DD&D schedules of the obstructing buildings. The Consent Order requires that DOE complete all corrective actions within the Los Alamos and Pueblo watershed by 2011. Building 21-0257 is collocated with MDA T, where final remedial action is scheduled in 2009 (NMED 2005a).

Areas in TA-21 are also designated for potential reutilization under Public Law 105-119. Section 632 of that law directed DOE to convey or transfer parcels of land at or in the vicinity of LANL to the Incorporated County of Los Alamos or the U.S. Department of Interior in trust for the Pueblo of San Ildefonso. DOE identified a number of tracts and subtracts of land for potential conveyance or transfer, including six subtracts within TA-21 as shown in **Figure H–6**. One of the TA-21 subtracts, TA-21-2, contains the DP West and DP East Sites, along with other currently occupied portions of TA-21. Section 4.1.1 includes additional information about the conveyance and transfer of TA-21 and other LANL tracts (DOE 1999c). These "subtracts" include DP Road-1 (A-8), DP Road-2 (A-9), DP Road-3 (A-10), DP Road-4 (A-11), TA-21-1 (A-15-1 and A-15-2), and TA-21-2 (A-16). All of the DP Road tract (46 acres [18.6 hectares]) and approximately 7.6 acres (3 hectares) of the TA-21 tract have been, or are expected to be, conveyed to Los Alamos County. The remaining portions of the TA-21 tract (referred to as subtracts A-15-2 and A-16), about 253 acres (102 hectares), contains the DP West and DP East Sites and the majority of the areas within TA-21 that will need to be remediated under the Consent Order.

In the midst of the DP Road tract there is a land parcel of approximately 10 acres (4 hectares) of private land that is currently occupied by private commercial and light industrial businesses not directly associated with LANL contracts. This land is surrounded on the east, north, and west by the DP Road tract (A-9, A-10, and A-15), and bounded on the south by the TA-21-2 tract. MDA B is located directly across DP Road from these businesses. There is the potential for deferral of the transfer of subtracts DP Road-1 and TA-21-1 until the investigation of MDA B is complete.

Three buildings are in the DP Road-4 subtract which has yet to be conveyed. These consist of two National Register of Historic Places eligible buildings (the LANL archives and warehouse), and a portable guardhouse that has been determined not eligible for listing on the National Register of Historic Places. Final characterization for radioactivity and hazardous materials contamination is incomplete and a determination of whether the structures need to be demolished prior to conveyance has yet to be made (LANL 2005g).

Although the TA-21-2 subtract is currently "deferred" from transfer to Los Alamos County because of legacy contamination and as a buffer zone for TA-53 operations, portions of it may still be considered for transfer after the remediation process is complete. The subtract is potentially attractive to businesses due to its proximity to the Los Alamos townsite, which suffers from a lack of land available for commercial development. Conversely, the remediation option selected for TA-21 might include significant quantities of radioactive materials remaining in place in a capped disposal site. This would result in significant areas being maintained under perpetual institutional control, making the remaining adjacent portions less desirable for development.

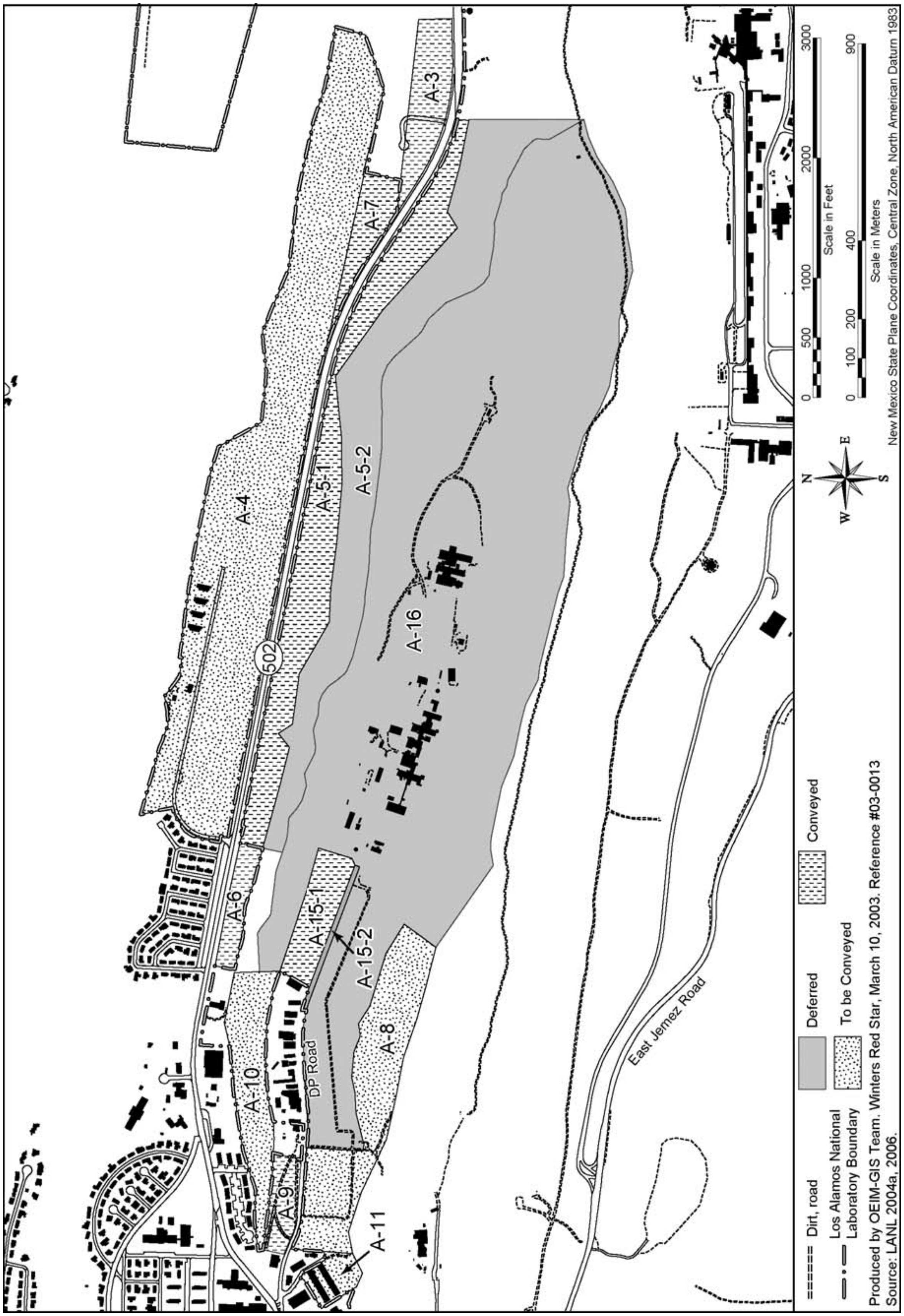

Figure H–6 Land Transfer

One possibility is removal of all buildings within subtract TA-21-2, and the subsequent evaluation of the resultant brownfield sites for potential reuse. Other possibilities include allowing the building foundations to remain, with or without application of a cap. Geophysical and radiological surveys have been conducted, potential release sites and boundaries identified, buried waste lines and structures located, and the nature and extent of geophysical and radiological anomalies determined (LANL 2005g). Based on this information, LANL staff can continue evaluating the reuse of portions of subtract TA-21-2 for industrial development and potential conveyance to Los Alamos County.

A number of previous NEPA determinations have been made that affect the proposed DD&D of TA-21. In 1995, DOE prepared the *Environmental Assessment of the Relocation of Neutron Tube Target Loading Operations*, DOE/EA-1131 (DOE 1995). The Proposed Action considered in that environmental assessment was the relocation of Neutron Tube Target Loading operations from TA-21 Building 21-0209 to Weapons Engineering Tritium Facility at TA-16 and associated upgrading of the building. Neutron Tube Target Loading involves the transfer of radioactive tritium gas onto metal target disks that are then assembled into neutron tubes. These neutron tubes are ultimately assembled into neutron generators that are used as nuclear weapons components. This environmental assessment specifically excludes consideration of the DD&D of Building 21-0209, but in addressing the relocation of these tritium activities, includes the subsequent deactivation of Building 21-0209. This Proposed Action was overtaken by the decision to relocate Neutron Tube Target Loading operations to Sandia National Laboratories.

DOE prepared the *Final Environmental Impact Statement for the Conveyance and Transfer of Certain Land Tracts Administered by the DOE and Located at LANL, Los Alamos and Santa Fe Counties, New Mexico, (CT ElS)*, DOE/EIS-0293 (DOE 1999c) to examine potential environmental impacts associated with the conveyance or transfer of each of the land tracts tentatively identified in the DOE's Land Transfer Report to Congress under Public Law 105-119. The transfer of TA-21 areas is considered under the *CT EIS*, including the DP Road and TA-21-1 tracts identified for transfer and development for commercial and industrial uses, and the TA-21-2 subtract, containing the DP East and DP West sites, that has been deferred. This development would bring additional members of the public into the vicinity of the DP West and DP East Sites.

The Environmental Assessment for the Proposed Issuance of an Easement to Public Service Company of New Mexico for the Construction and Operation of a 12-inch Natural Gas Pipeline within Los Alamos National Laboratory, Los Alamos, New Mexico, DOE/EA-1409 (DOE 2002c) analyzes the construction of a gas line that would provide natural gas to TA-53 and other LANL areas. The new line would provide a more reliable source of natural gas for the areas currently supplied by the line that crosses TA-21 near DP East, in the necessary quantity, reliability, and redundancy necessary to allow the TA-21 line to be used as a secondary or emergency source of natural gas to these areas. Although the TA-21 natural gas requirements would end if the TA-21 steam plant is shut down, maintenance of the cross-mesa line as a secondary feeder to TA-53 would require modifications to allow remediation activities at MDA A and MDA T.

In 2005, DOE completed the *Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production*, DOE/EA-1532 (DOE 2005b). This environmental assessment evaluates the potential impacts of relocating certain tritium handling operations from TA-21 and TA-16 to Sandia National Laboratories. This document and the associated finding of no significant impact provide NEPA analysis of installation of the Neutron Tube Target Loading process equipment in Building 870 at Sandia National Laboratories and subsequent target loading operations, but do not address the disposition of LANL tritium facilities.

Purpose and Need

There are numerous aging process and support buildings in TA-21 that are surplus to future LANL needs. Since the *1999 SWEIS* ROD, all activities associated with the NNSA missions have been relocated to other buildings at LANL, offsite locations, or have been discontinued. With their missions consolidated elsewhere, these buildings have been prioritized within the queue of buildings awaiting DD&D as part of LANL's program to reduce the surveillance and maintenance cost necessary to protect workers, the public, and the environment. The *1999 SWEIS* section on decommissioning includes a discussion but no formal consideration of the impacts of the DD&D of the DP West buildings (DOE 1999a). The movement among tritium facilities was discussed in general in the *1999 SWEIS*, and addressed specifically in the *Environmental Assessment of the Relocation of Neutron Tube Target Loading Operations* (DOE 1995). Thus, although the deactivation of all TA-21 process facilities has been the subject of NEPA analysis and is included in the No Action Alternative, NNSA has yet to formally consider the DD&D of the DP West and East Sites and of the remainder of TA-21 structures.

In addition to the general need to eliminate inactive legacy buildings and their associated overhead and maintenance costs, NNSA must remove many of these buildings to support the investigations of solid waste management units identified under the Consent Order. Some of these solid waste management units lie underneath buildings and slabs or are associated with past activities at the buildings. In addition, the TA-21 Liquid Radioactive Waste Treatment Facility is within the boundary of MDA T, and NNSA must remediate and manage the land associated with the building as part of that corrective action. The Consent Order requires that all corrective actions within the Los Alamos and Pueblo watershed be completed by 2011.

Finally, TA-21 has been designated as an area with potential for reuse under Public Law 105-119. The area is adjacent to the Los Alamos townsite and the airport, and is not (due to residual contamination) currently planned for conveyance or transfer to either Los Alamos County or the Department of Interior in trust for the San Ildefonso Pueblo. It is, however, the subject of a substantial planning effort to identify options for reuse after remedial actions are complete.

H.2.2 Options Description

This section provides descriptions of the three options – the TA-21 Complete DD&D Option of all structures within TA-21; the Compliance Support Option, which removes structures only as necessary to support the environmental restoration activities; and the No Action Option. The TA-21 Complete DD&D Option and the Compliance Support Option support the Expanded Operations and Reduced Operations Alternatives, respectively, within the overall SWEIS (Chapter 3 of this SWEIS).

As it continues to match missions to buildings, LANL staff identify buildings that are excess to its needs based on age, building condition, and current mission requirements. For decades, the DP West and DP East sites, which include buildings from the 1940s and 1950s that have hosted several radiological missions, have been identified for eventual DD&D. The *1999 SWEIS* projected that the DD&D of DP West would be completed by 2004, and identified the potential for (but did not analyze) the consolidation of TA-21 tritium operations to TA-16 (DOE 1999a). As part of a long-term plan to eventually DD&D these sites and allow for their environmental remediation and possible reuse, NNSA has not located any new missions at TA-21, and has relocated all TA-21 mission activities to buildings at other locations that are more structurally sound or operationally efficient. With the completion of the tritium mission in DP East, the NNSA planning process considers all of the TA-21 process buildings excess, with some in DP West already demolished.

The options identified for DD&D of the TA-21 buildings are generally consistent with the plan to DD&D the DP East and DP West Sites, and differ only in schedule and scope. All options begin with the DP East tritium buildings having completed deactivation.

H.2.2.1 No Action Option

The No Action Option assumes that the DP Site facilities would remain in their current status through 2011, the period analyzed by this SWEIS, and that there would be no additional DD&D during that period. All process facilities would be maintained under a surveillance and maintenance status, all administrative and logistics facilities would remain occupied or in their current service, and Building 21-0257 would maintain its capability to process liquid radioactive waste. Certain portions of the investigations and corrective actions for the DP Site under the Consent Order could be undertaken, but those that would be obstructed by existing buildings, and particularly Building 21-0257, would be postponed indefinitely. There would be continued surveillance and maintenance costs, minor emissions, and failure to achieve Consent Order milestones. All of the radioactively contaminated facilities in TA-21 must eventually undergo some level of decontamination and decommissioning; the No Action Option defers the actions and extends the public health liabilities for TA-21 radioactive facilities to an indeterminate future time.

H.2.2.2 Technical Area 21 Complete Decontamination, Decommissioning, and Demolition Option

Under this option all structures located within the boundaries of TA-21, including process buildings, administrative and logistics buildings, and support facilities would undergo DD&D. This would include the DD&D of infrastructure such as gas, water, and waste piping, electrical and communication lines, fences, and similar materials and equipment. NNSA would schedule DD&D activities to support the investigation and corrective actions required under the Consent Order. However, below-grade remediation activity not directly associated with structural foundations is not part of this scope and would be addressed separately as part of the Consent Order actions. The DD&D of buildings and structures with a possible interim use, such as the steam plant and piping and administrative and logistics facilities, could be deferred.

The TA-21 Complete DD&D Option would remove approximately 127 buildings and structures totaling approximately 271,000 square feet (25,177 square meters) (LANL 2006). It would generate approximately 35,000 cubic yards (26,760 cubic meters) of radioactive waste, 49,000 cubic yards (37,463 cubic meters) of nonradioactive waste, and would require on the order of 270,000 person-hours of DD&D effort. Combined with the associated remediation activities, this option would directly affect the entire mesa top from the end of the mesa on the east to MDA B on the west, plus canyon areas for the access road. Contractor facilities would be required, including a waste management area to load and ship waste and a clean soil stockpile area to accept incoming and excavated clean soils.

The current status of TA-21, as described in the beginning of Section H.2.2, would be the starting point for the initiation of activities under this option. Activities under this option would include the characterization of the DP West process facilities, removal of any remaining process piping and interior process and nonprocess equipment, surface decontamination and facility demolition. The TA-21 Liquid Radioactive Waste Treatment Facility (Building 21-0257) would be deactivated, and all process equipment would be removed from it and from the tritium facilities in DP East. These facilities would also proceed through the remaining elements of DD&D discussed in the beginning of Appendix H. The remaining TA-21 nonprocess buildings and structures would then be characterized and demolished, with waste disposal dependent on facility characterization information. The DD&D projects under this option would be coordinated with Consent Order remediation activities to support timely completion of Consent Order milestones. Activity scope would be coordinated to avoid duplication of efforts such as soil and below-grade pipe removal, area excavation, and revegetation. Detailed DD&D plans are currently being prepared for the contaminated facilities. Since initial planning and characterization is not complete, specific work plans, methods, schedules, and resources are not available. Therefore, the impact analysis has used the general methods identified above to provide a bounding case.

H.2.2.3 Compliance Support Option – Partial Decontamination, Decommissioning, and Demolition to Allow Consent Order Compliance

Under the Compliance Support Option, LANL workers would DD&D only those structures that cover or would interfere with activities to investigate and remediate MDAs, solid waste management units and other areas where releases of contamination to the environment are suspected. The DD&D of TA-21 would be initiated based on the DP Site Decontamination and Decommission Project as currently defined, since the scope of that project is to DD&D those facilities that inhibit or preclude the cleanup of solid waste management units. Under this option, there would be no further DD&D scope for TA-21 subsequent to this work, including any removal of buildings or structures to reduce surveillance and maintenance costs or support reutilization or conveyance under Public Law 105-119.

The Compliance Support Option would remove approximately 26 buildings and structures totaling approximately 200,000 square feet (18,580 square meters). It would generate approximately 35,000 cubic yards (26,760 cubic meters) of radioactive waste, 20,000 cubic yards (15,290 cubic meters) of nonradioactive waste, and would require on the order of 240,000 person-hours of DD&D effort (LANL 2006). It would directly affect an area of approximately 14 acres (5.7 hectares) in TA-21, including grading and revegetation, although this would overlap with areas remediated as part of the Consent Order. **Table H–4** shows the TA-21 structures that would undergo DD&D in conjunction with the Compliance Support Option.

Table H–4 Technical Area 21 Buildings to Undergo Decontamination, Decommissioning, and Demolition for the Compliance Support Option

Property Identification	*Description*
21-0002	Wet laboratory north + south
21-0002	Wet laboratory north + south mezzanine
21-0003	Remaining structure + adjacent asphalt
21-0004	Remaining structure + adjacent asphalt
21-0005	Laboratory north + south
21-0005	Laboratory north + south - mezzanine and attic
21-0005	Laboratory basement
21-0021	Building slab only
21-0046	Warehouse
21-0089	Pressure relief valve
21-0116	Hot tool room, including basement
21-0144	Utility/passageway
21-0149	Corridor
21-0150	Basement
21-0150	Mezzanine
21-0150	Molecular chemistry
21-0152	Laboratory building
21-0155	1st floor
21-0155	External mezzanine
21-0209	1st floor
21-0209	Basement
21-0210	Plutonium research
21-0228	Warehouse-slab only
21-0230	Sludge drying bed
21-0257	Liquid Radioactive Waste Treatment Plant
21-0257	Underground piping
21-0258	West water tower
21-0286	Warehouse - radioactive
21-0312	Corridor
21-0313	Corridor
21-0314	Corridor
21-0315	Corridor
21-0342	East water tower
RW Lines	Radioactive waste lines at Technical Area 21

Source: LANL 2006.

In practice, the initial actions of this option would be the same as the TA-21 Complete DD&D Option. LANL workers would characterize the DP West process facilities, remove any remaining process piping and interior nonprocess equipment, decontaminate surfaces, and demolish the facilities. Similarly, the TA-21 Liquid Radioactive Waste Treatment Facility

(Building 21-0257) would be deactivated, and all process equipment removed from it and from the tritium facilities in DP East. These facilities would also proceed through the elements of characterization, decontamination, and demolition, which would result in removing most of the contaminated facilities from TA-21. The Compliance Support Option would also remove approximately seven additional buildings and structures that are largely uncontaminated but would obstruct remediation actions necessary to comply with the Consent Order. Various portions of the utilities infrastructure including gas, steam, water, sewage, and electrical lines and water towers would need to be removed to facilitate the investigation and remediation of MDAs and solid waste management units in both this and the TA-21 Complete DD&D Option. After removal of this infrastructure, an additional effort would be required to reroute or compensate for these interrupted services to the buildings that remain occupied after completion of Compliance Support Option DD&D activities.

H.2.3 Affected Environment and Environmental Consequences

This section describes the natural and human environment that could be impacted during the DD&D of TA-21 buildings and structures and provides the context for understanding any associated environmental consequences. The analysis of environmental consequences relies on the affected environment descriptions in Chapter 4 of this SWEIS. Where information specific to TA-21 is available and adds to the understanding of the affected environment, it is included here. The affected environment descriptions in this section serve as a baseline from which any environmental changes brought about by implementing one of the options can be evaluated; the baseline conditions are the existing conditions.

The definition of existing conditions is complicated by the evolution of TA-21 activities. Over the past several years, TA-21 tritium operations have been discontinued and there have been limited DD&D activities – equipment has been removed from several buildings and other buildings have been demolished. As a result, TA-21 characteristics may show variations independent of any action considered in this document. This is discussed in more detail in the individual resource sections.

An initial assessment of the potential impacts of the proposed project identified resource areas for which there would be no or only negligible environmental impacts. Consequently, for the following resource areas, a determination was made that no further analysis was necessary: environmental justice and infrastructure.

H.2.3.1 No Action Option

The No Action Option assumes that the administrative, logistics, and office activities currently occurring at TA-21 would continue. As there would be no additional DD&D at TA-21, the western portion of the area (that is, the 7.55-acre [3-hectare] TA-21-1 [West] Parcel) would be conveyed to Los Alamos County in the condition planned, with structures and infrastructure intact. The remainder of the TA would remain a part of LANL in an ongoing state of surveillance and maintenance. The No Action Option would have little or no additional effect on water resources except for the elimination of the National Pollutant Discharge Elimination System (NPDES) outfall associated with the deactivation of the Tritium Science and Fabrication Facility. Similarly, no changes to current radiological and nonradiological emissions or air pollutant concentrations are expected under the No Action Option, except those resulting from the deactivation of the TA-21 tritium facilities. Tritium emissions should diminish through 2011 even without DD&D, especially if ventilation at DP East could be terminated. Ecological and cultural characteristics of TA-21 would remain largely unchanged from existing conditions, whereas public and worker dose resulting from radiological emissions from TA-21 would be expected to be consistent with, and less than, historical values. The No Action Option would eliminate the generation of waste that would otherwise be generated from DD&D and environmental restoration projects under the TA-21 Complete DD&D Option and Compliance Support Option.

H.2.3.2 Technical Area 21 Complete Decontamination, Decommissioning, and Demolition Option

Land Resources

Land Use

TA-21 consists of about 312 acres (126 hectares) at the eastern end of DP Mesa, near the central business district of the Los Alamos Townsite. The airport is located immediately north of TA-21, across DP Canyon. About 20 percent of the TA has been developed with the west-central portion of the tract containing the majority of development; remaining portions of the TA consist of sloped areas, some of which would likely not accommodate development. Access to the site is via DP Road (LANL 1999). As noted in Section H.2.1, facilities at TA-21 have until recently supported tritium research.

TA-21 is one of a number of TAs identified for conveyance to Los Alamos County under Section 632 of Public Law 105-119 (see SWEIS Chapter 4, Section 4.1.1). This TA has been divided into two tracts for purposes of the land conveyance, TA-21-1 (West) and TA-21-2 (East). These tracts have also been designated as A-15 and A-16, respectively (see Figure 4–6). The former parcel is 7.55 acres (3 hectares) and is slated to be conveyed to the county. Parcel TA-21-2 (East) is 252.1 acres (102 hectares); however, its conveyance has been deferred.

Land use within TA-21 has, until recently, included Waste Management, Service and Support, Nuclear Materials Research and Development, and Reserve (see Figure 4–4). According to the *Comprehensive Site Plan* for 2001, TA-21 falls within the Omega West Planning Area. The *Comprehensive Site Plan* indicates that all TAs within the planning area will eventually be decommissioned (LANL 2001a). Two areas within TA-21 are noted as No Development Zones (Hazard). TA-21 also includes six MDAs and numerous solid waste management units and Areas of Concern that will have to be addressed and potentially remediated in support of the Consent Order.

DD&D Impacts—Following DD&D of the buildings and structures within that part of TA-21 that has been deferred from conveyance to Los Alamos County (that is, the 252.1-acre [102-hectare] TA-21-2 [East] Parcel and 1.18 acre [0.5 hectare] A-15-2 Parcel), portions of the area could be considered as brownfield sites for potential reuse. Pending a decision relating to reuse, the redesignation of portions of the TA-21 from Waste Management, Service and Support, and

Nuclear Materials Research and Development to Reserve is in keeping with the present designation of the remaining land within TA-21, as well as adjacent TAs (LANL 2003a).

Visual Environment

Facilities at TA-21 are situated on DP Mesa, which is located between Los Alamos Canyon to the south and DP Canyon to the north. Developed portions of the TA present an industrial appearance. Undeveloped portions of the mesa remain moderately vegetated with native grasses, shrubs, and small trees. The canyons are wooded. The site, particularly the water tower, can be seen from locations along State Road 502. Developed portions of TA-21 are visible from higher elevations to the west. An analysis of the visual quality of the site determined that both developed and undeveloped areas of the site had low public value for visual resources (DOE 1999c).

DD&D Impacts—DD&D activities would have short-term adverse impacts on visual resources due to the presence of heavy equipment and an increase in dust. Following removal of buildings and structures within TA-21, the area would be contoured and revegetated, as appropriate, resulting in an improved visual environment. Since the area could be developed in the future, these efforts would be aimed primarily at soil stabilization and not at recreating a more natural environment. With future redevelopment possible, the view of the TA from State Route 502 and from higher elevations to the west could remain commercial and industrial in nature. Nevertheless, with proper planning, the view would be of modern architecturally compatible buildings rather than the current mix of 50-year-old structures.

Geology and Soils

The TA-21 buildings and structures are subject to the same general geology and seismic conditions as the entire LANL site. As discussed in this SWEIS, Chapter 4, Section 4.2.2, geologic mapping and related field and laboratory investigations that included TA-21 revealed only small faults that have little potential for seismic rupture.

The LANL soil-monitoring program conducts annual sampling of soils for contaminants in and around the LANL facility. The program has identified TA-21 soils and soil samples from an adjacent area near the airport as the only LANL areas routinely exceeding Regional Statistical Reference Levels for plutonium, although the levels remain below levels that would require active remediation. The elevated contaminant levels are the result of actinide processing activity conducted at the DP West facility prior to its transfer to the TA-55 facility in the 1970s. There was no impact on the TA-21 soils from the Cerro Grande Fire.

DD&D Impacts—Under all options, the impact of a seismic event has been reduced by the deactivation of the DP East facilities and removal of a majority of the source material present. Since no new facilities would be constructed under the TA-21 Complete DD&D Option, there would be no new potential seismic impact. The TA-21 Complete DD&D Option would have a minor impact on the geologic and soils resources at LANL as the affected facility areas are already developed and adjacent soils are already disturbed. The DD&D activities would introduce some additional ground disturbance in excavating foundations and establishing laydown yards and waste management areas near the facilities to be demolished. However, the impacts would be temporary and available paved surfaces, such as adjacent parking lots, would be used to mitigate any impact. The degree of soil disturbance from this option is expected to be much smaller than that resulting from major remediation activities under the Consent Order. The primary indirect impact would be associated with the need to excavate any contaminated tuff and soil not addressed by the Consent Order from beneath and around facility foundations. Borrow material (such as crushed tuff and soil) would be required to fill the excavations to grade. Such resources are available from onsite borrow areas (see Chapter 5 of this SWEIS, Section 5.2) and in the vicinity of LANL.

Water Resources

Since the DP West and DP East buildings were constructed in 1945, they have used domestic and industrial water and have discharged cooling water to the DP Canyon. Building 21-0227 originally treated TA-21 sewage and industrial wastewater effluents prior to discharge to the DP Canyon. In 1999, this waste stream was rerouted to the TA-46 Sanitary Wastewater Systems Plant. Past soil contamination could impact surface water contamination levels in runoff, contamination migration through the soil, and contamination levels that may be present in the groundwater.

TA-21 water usage has averaged about 25 million gallons (95 million liters) per year over the past 5 years, representing about 5 percent of LANL usage. As the tritium mission at DP East is completed, the need for process and cooling water is expected to decrease, leaving domestic usage and building ventilation (steam heat and cooling water) as the only major continuing uses.

There are two NPDES outfalls into the DP Canyon, which is considered part of the Los Alamos Canyon watershed. **Table H–5** provides the actual annual flows of these outfalls as identified in the *2004 SWEIS Yearbook* for the TA-21 facilities, the Steam Plant and the Tritium Science and Fabrication Facility (LANL 2005d).

Table H–5 Volume of Technical Area 21 National Pollutant Discharge Elimination System Outfalls (millions of gallons per year)

Facility Mission	*NPDES Outfall Designation*	*Source Building*	*Building/Process Description*	*2004 SWEIS Yearbook Actual Flow*
Tritium	02A-129	155N, 357	Steam Plant	22.01
Tritium	03A-158	209	Tritium Science and Fabrication Facility	0.09

NPDES = National Pollutant Discharge Elimination System.
Note: To convert gallons to liters, multiply by 3.785.
Source: LANL 2005d.

Most of the TA-21 site is sloped so that stormwater from the buildings and parking lots drain into either the DP or Los Alamos Canyons. TA-21 is located on a mesa top and not within the 100-year or 500-year floodplain boundaries. TA-21 currently contains four active aboveground fuel storage tanks and one active underground fuel storage tank, some of which are empty in anticipation of closure or DD&D.

DD&D Impacts—The TA-21 Complete DD&D Option would result in little or no effect on overall LANL water use or resources. Water use and discharges associated with the use of TA-21 office and logistics facilities would be reduced. The outfalls from the Tritium Science and Fabrication Facility and the Steam Plant would be eliminated, which would have a minor effect on surface water quality in Los Alamos Canyon. These industrial effluents comprise less than 40 percent of the discharges into that canyon. Removal of these discharges would have little effect on surface water quality, as the majority of the effluent is boiler blowdown and cooling water, which contains fewer contaminants than wastewater. However, as organizational functions are transferred to other LANL buildings, there would be compensating increases in the water and steam uses by those buildings. If TA-21 actions are limited to those required by the Federal Facility Compliance Agreement, then there would be little impact on surface water quantity and quality in Los Alamos Canyon, as only the Tritium Science and Fabrication Facility outfall would be eliminated.

This option would not result in the disturbance of watercourses or generation of liquid effluents that would be released to the surrounding environment. Silt fences, hay bales, or other appropriate best management practices would be employed (as described in stormwater pollution prevention plans) to ensure that fine particulates are not transported by stormwater or water used in dust suppression into surface water features in the DP or Los Alamos Canyons. Potable water use at the site would be limited to that necessary for equipment washdown, dust control, and sanitary facilities for workers. Impacts of DD&D activities on groundwater should be minimal because of surface water collection practices, especially in comparison to the impact from environmental restoration activities being conducted to comply with the Consent Order. Any final contouring of industrial areas and subsequent soil stabilization would be in conjunction with remediation activities necessary for compliance with the Consent Order. Groundwater profiling and any actions required to remediate past spills would be undertaken as part of the TA-21 remediation activities.

Air Quality and Noise

This section discusses radioactive and nonradioactive air emissions specific to TA-21. Radiological doses are discussed under Human Health.

Air Quality

Emissions from TA-21 activities include pollutants that have the potential to impact co-located LANL workers and the surrounding community, including radiological emissions from operating facilities and facilities in a state of surveillance and maintenance, as well as radioactive and nonradiological emissions from buildings and DD&D projects. The proximity of TA-21 to the Los Alamos townsite and to the recently transferred "DP Road" tract places all TA-21 emission sources close to the LANL site boundary and the public. NNSA plans, executes, controls, and monitors new and established TA-21 building and activity emissions to ensure worker and public safety, and to verify pollutant levels are within established regulatory limits.

Nonradioactive Emissions. Activities generating nonradioactive air pollutants at TA-21 include the Steam Plant, vehicle exhaust, and minor emissions from activities in the maintenance facilities operated by the LANL maintenance contractor. Emissions from the TA-21 Steam

Plant are shown in **Table H–6**. DD&D activities have produced small amounts of fugitive dust consistent with dust generation that would result from normal construction activities (LANL 2004b).

Table H–6 Calculated Actual Emissions for Regulated Pollutants Reported to the New Mexico Environment Department for 2004

Pollutants	*Nitrogen Oxides*	*Sulfur Oxides*	*Particulate Matter (less than or equal to 10 micron)*	*Carbon Monoxide*	*Volatile Organic Compounds*	*Hazardous Air Pollutants*
TA-21 Steam Plant	1.6	0.012	0.12	1.33	0.09	0.03
All Other LANL	49.0	1.6	4.7	34.1	11.4	6.7
Total	50.5	1.6	4.8	35.5	11.4	6.7
Percent TA-21 Steam Plant	3.1	0.8	2.5	3.8	0.8	0.4

TA = technical area.
Note: Air emissions in tons per year (LANL 2005f).

As part of the Title V operating permit application, the New Mexico Environment Department requested that LANL provide a facility-wide air quality impacts analysis. The analysis included emissions from the TA-21 boilers and demonstrated that simultaneous operation of all regulated air emission units described in the Title V permit application, being operated at their maximum requested permit limits, would not result in any ambient air quality standards being exceeded (LANL 2003e).

The limited amount of ambient air sampling that has been performed for nonradioactive air pollutants within the LANL region is discussed in Chapter 4 of this SWEIS. TA-21 has no current operations that would result in beryllium emissions, although past activities at TA-21 facilities have involved handling of beryllium materials (LANL 2005f).

The NESHAP for asbestos requires that NNSA provide advance notice to the New Mexico Environment Department for large renovation jobs that involve asbestos and for all demolition projects such as at TA-21. The asbestos NESHAP further requires that all activities involving asbestos be conducted in a manner that mitigates visible airborne emissions and that all asbestos-containing wastes be packaged and disposed of properly. To ensure compliance, NNSA has established an Asbestos Report Project with internal requirements defined in their Quality Assurance Project Plan, and conducts internal inspections of job sites and asbestos packaging on approximately a monthly basis (LANL 2003d, 2005f).

DD&D Impacts—Under the TA-21 Complete DD&D Option, the operational emission sources would be relocated or cease as the activities are relocated and the buildings demolished. There would be temporary increases in vehicle exhaust and fugitive dust during the demolition. Initial air emissions from TA-21 would be similar to current emissions. The nonradioactive air pollutant emissions from the three natural gas fired boilers in Building 21-0357 would be eliminated. Vehicle exhaust and emissions from activities in the maintenance and support facilities would be expected to follow these functions to their new location within LANL. The emissions produced from the use of toxic chemicals in the laboratory and the Liquid Radioactive Waste Treatment Facility, already reduced during deactivation, would be eliminated, as the process buildings are placed into surveillance and maintenance status and subsequently demolished.

Demolition and removal of radiological and nonradiological buildings and structures would result in temporary air quality impacts from construction equipment, truck, and employee vehicle exhaust. Criteria pollutant concentrations were not modeled for demolition of buildings at TA-21, but would be less than for construction of new facilities occurring concurrently at LANL. Concentrations offsite and along the perimeter road to which the public has regular access would be below the ambient air quality standards. Building demolition would also result in particulate (fugitive dust) emissions. The dust could include small amounts of lead, asbestos, and other nonradioactive hazardous constituents despite methods and controls used to mitigate such contaminants and ensure DD&D worker and co-located employee safety during demolition. Although the DP Canyon separates the DP Mesa from the site boundary, the proximity to the public would require active measures to ensure dust suppression and control. This option would result in the DD&D of a greater number of buildings than the Compliance Support Option. If the dust generated by demolition is assumed to be roughly proportional to the demolition waste volume, then the dust generated by the TA-21 Complete DD&D Option would be approximately 40 percent greater than that generated by the Compliance Support Option.

Radioactive Emissions. Radiological emissions from the TA-21 facilities are shown in **Table H–7**, and the ambient air sampling data at the center of TA-21 and at the East Gate (at the LANL perimeter across the DP Canyon north of TA-21) are shown in **Table H–8**.

Tritium emissions from the Tritium Systems Test Assembly and the Tritium Science and Fabrication Facility exhaust ventilation stacks has decreased since 2003, in part due to the completion of active source removal activities at TA-21-155 and initiation of surveillance and maintenance status. Continued emissions from this facility, the result of off-gassing from contaminated equipment that remains in the building, requires continued monitoring until the potential emission levels from TA-21-155 are fully characterized. As TA-21-209 tritium-contaminated systems are dismantled and prepared for removal and disposal, increased emissions of tritium are expected. However, overall long-term emissions from these facilities would decrease following deactivation (LANL 2004b). There may be a short-term increase in tritium emissions from the Tritium Systems Test Assembly and Tritium Science and the Fabrication Facility during removal and relocation of tritium processing equipment, with emissions in the range of 1 to 7 curies per week from each facility. Since these increases should only be for limited periods, annual emissions would remain well below the facility 5-year averages.

Table H–7 Technical Area 21 Radiological Point Source Emissions

Location	*Emissions Point*	*Six-year Average (1999-2004) Radionuclide Emissions (curies per year)* [a]
21-155 (TSTA Stack)	21015505	271 (tritium) [b]
21-209 (TSFF Stack)	21020901	538 (tritium) [b]
Total		809 (tritium) [b]

TSTA = tritium systems test assembly, TSFF = Tritium Science and Fabrication Facility.
[a] Sources: LANL 2000c, 2001b, 2002c, 2003c, 2004e, 2005h.
[b] Tritium gas and tritium oxide combined.

Table H–8 Technical Area 21 Ambient Air Monitoring

Radionuclide	2004 Average Concentrations (curies per cubic feet) [a]	
	Concentration at East Gate Location (north of LANL east of the airport)	Concentration at TA-21 (central between DP East and DP West)
Tritium	1.5×10^{-13}	1.5×10^{-13}
Americium-241	-1.7×10^{-20}	1.0×10^{-20}
Plutonium-238 [b]	2.2×10^{-21}	1.5×10^{-20}
Plutonium-239 [b]	-6.2×10^{-21}	1.2×10^{-20}
Uranium-234	1.7×10^{-19}	1.9×10^{-19}
Uranium-235 [b]	-5.1×10^{-21}	1.2×10^{-20}
Uranium-238	1.3×10^{-19}	1.8×10^{-19}

TA = technical area.
[a] Source: LANL 2005h.
[b] Negative values are the result of analytical uncertainties due to the small quantity of material present in the sample, and from the adjustment to account for background radionuclide concentrations.
Note: To convert curies per cubic feet to curies per cubic meters, multiply by 0.028.

Information on past building DD&D emissions at DP West was developed during the Building 3 and Building 4 South DD&D project. Stack monitors remained operational until the main ventilation systems were bypassed and capped in 1994 and 1995. For the first 3 years of the project (1991 through 1993) stack emissions were 9.2×10^{-5}, 5.1×10^{-5}, and 5.3×10^{-5} curies combined uranium and plutonium, respectively. This is comparable to routine emissions data for other LANL operating facilities as shown in Chapter 4, Section 4.4.3.1 of this SWEIS. Additionally, during the demolition of decontaminated buildings with areas of stabilized residual contamination, numerous air monitors placed at the perimeter of the controlled area detected no activity above background (LANL 1995).

Ambient air samples were analyzed for 10 radionuclides, and concentrations of the radionuclides that are relevant to activities at TA-21 are shown in Table H–8. The elevated tritium concentrations at TA-21 and the East Gate locations are likely to be at least partially the result of Tritium Systems Test Assembly and Tritium Science and the Fabrication Facility emissions, although ambient air sampling cannot unambiguously determine the sources of the radionuclides detected. The source of the uranium and transuranic air concentrations are less apparent, although some of these concentrations are near regional background levels.

DD&D Impacts—Even during surveillance and maintenance, radiological facilities could produce radiological emissions, depending upon the operational status of the building exhaust systems. During initial DD&D, there would be emissions during the removal of equipment and decontamination of structural surfaces. While the building shell is intact, emissions would result from building or temporary ventilation systems used for dust and contamination control. These systems would use high-efficiency particulate air filtration to reduce entrained airborne radioactivity prior to exhausting air from interior contaminated spaces to areas outside the building. Ventilation and other controls would be used to minimize worker inhalation and exposure to radioactivity and avoid recontamination of previously decontaminated areas. The result of the initial activities would be structural surfaces either decontaminated to unconditional-release levels or with selected contaminated surfaces stabilized to permit segregation of radioactively contaminated and uncontaminated debris after demolition.

The potential exists for contaminated soils, building debris, and possibly other media to be disturbed during building demolition. Release of radioactivity would be minimized by proper decontamination of buildings prior to demolition – if facilities are decontaminated to unconditional release levels as prescribed by the MARSSIM protocol, emissions would be similar to those from uncontaminated buildings. If residual levels of contamination remain after decontamination activities are complete, then small amounts of radioactivity would be emitted during demolition. The radionuclide concentrations resulting from demolition of contaminated facilities can be predicted based on the predemolition characterization of the building, and would be addressed in regulatory documents approved at that time. Such emissions typically would be of short duration, and would be minimized using dust suppression techniques and monitored along with the fugitive dust. This option would result in the DD&D of a greater number of buildings than the Compliance Support Option, but the number of radioactively contaminated buildings would be essentially the same.

Noise

The activities at TA-21 are similar to those of other office and laboratory areas at LANL. Operations noise sources include heating, ventilation, and cooling equipment, generators, and vehicles. DD&D and construction activities have also generated noise for limited periods. Minimal noise impacts are generated by current TA-21 activities.

DD&D Impacts—Noise levels during demolition activities would be consistent with those typical of construction activities. As appropriate, workers would be required to wear hearing protection to avoid adverse effects. Noninvolved workers at the edge of the demolition areas and members of the public on the perimeter road would be able to hear the activities; however, the level of noise would not be expected to result in increased annoyance. Construction noise at LANL is common. Some wildlife species might avoid the immediate vicinity of the TA-21 demolition sites as demolition proceeds due to noise; however, any effects on wildlife resulting from noise associated with the demolition activities would be expected to be temporary.

Ecological Resources

This section addresses the ecological setting (terrestrial resources, wetlands, aquatic resources, and protected and sensitive species) of TA-21. Ecological resources of LANL as a whole are described in Chapter 4, Section 4.5 of this SWEIS, and the vegetation zones are depicted in Figure 4–25.

While most of TA-21 is located within the Ponderosa Pine (*Pinus ponderosa* P. & C. Lawson) Forest vegetation zone, the more easterly portions of Los Alamos Canyon are within the Piñon- (*Pinus edulis* Engelm.) Juniper (*Juniperus monosperma* [Engelm.] Sarg.) Woodland vegetation zone. Also, mixed conifer forest occurs along north facing canyon walls (see Figure 4–25). About 20 percent of the area is developed as roadways, parking lots, and facilities with associated landscaping (DOE 1999c). Wildlife within undisturbed portions of the TA would be expected to be typical of those two communities. The Cerro Grande Fire (LANL 2000a) did not directly affect TA-21. Wildlife use of developed portions of the site would be expected to be minimal, with large mammals being excluded from the area due to the presence of security fencing.

There are no wetlands within TA-21 (Army Corps of Engineers 2005). Los Alamos Canyon contains a perennial water source flowing a few cubic feet per second during most of the year (DOE 1999c). Aquatic resources within the Los Alamos Canyon stream would be limited since no fish have been found in any LANL streams.

TA-21 falls within the Los Alamos Canyon Mexican spotted owl (*Strix occidentalis lucida*) Areas of Environmental Interest with the southern and eastern portions included within the core zone. TA-21 does not include any portion of the Areas of Environmental Interest for the bald eagle (*Haliaeetus leucocephalus*) or southwestern willow flycatcher (*Empidonax traillii extimus*) (LANL 2000b).

DD&D Impacts—All DD&D activities analyzed in this SWEIS would take place within the industrial area of TA-21, which contains little wildlife habitat. Wildlife in canyons adjacent to TA-21 could be intermittently disturbed by construction activity and noise over the demolition period when heavy equipment would be used to raze structures, remove building foundations and buried utilities, excavate contaminated soil, and transport wastes to disposal sites. Demolition related disturbances to wildlife are expected to be intermittent and localized. Upon DD&D of the buildings and structures within TA-21, the site would be contoured and revegetated. However, revegetation would have only relatively short-term benefits to wildlife since it is likely that the area could be developed in the future.

There are no wetlands located within TA-21. Thus, the elimination of two NPDES-permitted outfalls nor DD&D activities would affect this resource.

Excess noise or light associated with the removal of buildings and structures at TA-21 has the potential to disturb the Mexican spotted owl. Direct loss of habitat would not occur, since all activities would take place within developed portions of the TA. However, if DD&D were to take place during the breeding season (March 1 through August 31) owls could be disturbed and surveys would need to be undertaken to determine if owls were present. If none were found, there would be no restrictions on DD&D activities. However, if owls were present, restrictions could be implemented to limit noise and lighting (LANL 2000b). Since future development is likely within TA-21, DD&D of buildings and structures would not result in a long-term change in current habitat conditions with respect to the Mexican spotted owl.

Human Health

Routine operations and activities at TA-21 facilities result in LANL workers and the public receiving a radiation dose above background radiation levels, either through direct radiation exposure or through the inhalation or ingestion of radioactivity in the air or elsewhere in the environment. Subsections discuss TA-21 radiological doses to certain receptors, followed by the impact of those doses on the public and LANL workers. The "Worker Health" section also discusses the impacts from DD&D industrial accidents. Nonradiological air emissions and their effects are discussed in the "Air Quality" section and the effects of traffic accidents are discussed in the "Transportation" section in the following pages. The risk of facility accidents during the DD&D of TA-21 facilities was evaluated based on the radioactive material-at-risk estimated to remain in each individual process building after its deactivation or during surveillance and maintenance. On the basis of this evaluation, the environmental impacts for releases that could result from a facility accident at TA-21 are bounded by the impacts of previously evaluated accidents at the same location, and are not further addressed in this analysis.

NNSA evaluates the public impact of radionuclide emissions by direct monitoring of emission point sources and ambient air monitoring. The radiation doses calculated from the radiological emissions from TA-21 facilities are shown in **Table H–9**. Radiological doses determined from the ambient air sampling at TA-21 and the adjacent East Gate locations are shown in **Table H–10**.

Table H–9 Maximally Exposed Individual Average Radiological Doses from Technical Area 21 Point Source Emissions

Location	*Six-year Average Dose (1999-2004) (millirem per year)*	
	Dose to LANL MEI at East Gate	*Dose to Facility-Specific MEI*
21-155 (TSTA Stack)	0.0111	0.0105
21-209 (TSFF Stack)	0.0101	0.0228
Total	0.0212	0.0333

MEI = maximally exposed individual, TSTA = Tritium Systems Test Assembly, TSFF = Tritium Science and Fabrication Facility.
Sources: LANL 2000c, 2001b, 2002c, 2003c, 2004e, 2005h.

Table H–10 Radiological Doses (above background) Measured at Technical Area 21 and the East Gate Locations, Based on Ambient Air Monitoring

Radionuclides	*Six-year Average Dose (1999-2004) (millirem per year)*	
	Annual Dose at the East Gate Location (north of LANL east of the airport)	*Annual Dose at TA-21 (central between DP East and DP West)*
Tritium	0.0428	0.0465
Americium-241	0.00233	0.00367
Plutonium-238	0.000333	0.000667
Plutonium-239	0.000333	0.0100
Uranium-234	0.00600	0.00933
Uranium-235	0.00117	0.00167
Uranium-238	0.00783	0.0120
Total	0.0617	0.0833

TA = technical area.
Sources: LANL 2000c, 2001b, 2002c, 2003c, 2004e, 2005h.

Table H–9 provides the basis for assessing impact to the public from existing TA-21 operations. Radioactive material processing facilities in TA-21 collect, filter, and exhaust air from contaminated portions of the facility through ventilation exhaust stacks under normal operating conditions. Dispersion modeling techniques use the calculated radionuclide emissions data shown in Table H–7, along with other inputs to predict the radiological doses for hypothetical individuals at selected locations and for the collective population dose received by the surrounding community. The information in Table H–9 indicates the average annual radiological impact that the facilities within TA-21 have had on the surrounding community for the last 5 years. As deactivation activities are completed, the radiological dose attributable to tritium emissions should decrease independent of the options.

The radiological dose shown in Table H–10 is the average annual dose that a hypothetical individual would receive if they breathed air with the net airborne radionuclide concentration (sampled minus background) collected from the designated location. Although both radiological doses are low, the dose at the TA-21 location is modestly higher, as might be expected closer to the tritium facility stacks and the DD&D of the moderately contaminated buildings removed during the sampling period. The radiological dose is derived in approximately equal parts from tritium, transuranic (plutonium and americium), and uranium isotopes. The East Gate location is common to both Table H–9 (emissions sampling and dose calculated by dispersion modeling) and Table H–10 (dose calculated using ambient air sampling data). The values given for tritium dose, the only radionuclide present in substantially elevated levels, shows reasonable agreement between the two tables for that location, given the difference in methods and the presence of other LANL emissions that could contribute to the hypothetical ambient dose.

Public Health

The LANL maximally exposed individual is a hypothetical member of the public who, while not on LANL property, would receive the greatest dose from LANL operations (see Chapter 4 of this SWEIS, Section 4.6). The location of this maximally exposed individual during most years of the analysis has been at the East Gate along State Road 502, entering the east side of Los Alamos County. The 6-year (1999 through 2004) average dose the LANL maximally exposed individual would have received is 1.14 millirem per year (based on emission sampling and dispersion modeling, not the ambient air monitoring value shown in Table H–10; see Chapter 5 of this SWEIS, Section 5.6), less than one percent of the naturally occurring background radiation dose (estimated to range from 350 to 500 millirem per year based on where the individual lives). Of the dose to the LANL maximally exposed individual at the East Gate, the average portion attributed to the TA-21 facilities was minimal (0.0212 millirem per year).

In addition to the LANL maximally exposed individual, each Key Facility has a facility-specific maximally exposed individual, a hypothetical member of the public who, while at a location near that facility but not on LANL property, would receive the greatest dose from all Key Facilities. As shown in Table H–9, the average TA-21 facility-specific maximally exposed individual is 0.0333 millirem per year.

The 6-year (1999 through 2004) average collective population dose attributable from all LANL operations to persons living within 50 miles (80 kilometers) of LANL was 1.02 person-rem. Tritium, from DP East as well as other Key Facilities, contributed to this population dose; however, most of this population dose resulted from the short-lived air activation products from the Los Alamos Neutron Science Center (LANSCE) (LANL 2004b).

DD&D Impacts—The DD&D process could cause temporary increases in radiological emissions that could be controlled within acceptable limits, but would result in the elimination of residual emissions from legacy structures. Removal of legacy structures also would permanently preclude any uncontrolled releases that would result from the failure of deteriorating structures or external factors such as wildfires. Environmental remediation activities that would follow DD&D perform a similar function for contaminated soil or environmental media, trading minimal temporary emissions for long-term risk reduction. There would be no direct radiation exposure to members of the public during this project due to the prohibition of public access to DD&D areas and the low levels of radiation present after deactivation.

Radiological emissions from TA-21 facilities under the TA-21 Complete DD&D Option would be divided into two phases. In the first phase, DD&D activities occurring within the building would take advantage of building integrity and certain building systems for contamination and emissions control. The second phase would be the short period during structural demolition for each building after decontamination is complete. A small fraction of any remaining radioactive contamination (and other hazards) could become airborne as the structure is demolished.

Estimating the dose received by the public from the in-building DD&D activities is difficult since there is little facility characterization or planning data available, including levels of radioactivity in equipment and how building and other contamination control systems would be used. Given the limited data, one approach to developing a bounding estimate radiation dose to the public is to assume that the emissions from in-building DD&D would be similar to the emissions from the building during operations. The types of radioactivity and controls would be similar, the building structure would be intact, and tritium trapping and filtration systems would be in place for ventilation exhaust during decontamination. The estimate would be conservative because, with the removal of accountable quantities of radioactive materials and cessation of process activities, levels of radioactivity present in the building would be orders of magnitude less than levels present during operation. Additionally, radioactivity would be continually reduced as equipment and materials are packaged as waste and removed. The 6-year average dose received by East Gate maximally exposed individual from current emissions from the DP East tritium facilities is 0.0212 millirem per year (see Table H–9)

A second approach to estimating the dose received by the public is to compare it to emissions from similar previous DD&D projects. The Building 3 and Building 4 South DD&D project at DP West had stack emissions during in-building DD&D activities ranging from an initial high of 92 microcuries of uranium and plutonium the first year of the project to a low of 27 microcuries the final year of the project. A conservative calculation of the dose received from this emission suggests the East Gate maximally exposed individual would receive less than 0.02 millirem per year. While it is difficult to accurately quantify the impact of in-building DD&D activities on the public, it is clear that the dose that would be received would be significantly less than one millirem per year.

Based on conservative estimates of residual levels of surface contamination and no mitigation on emissions during demolition from surface sealants or water spray, the dose that would be received by the East Gate maximally exposed individual over the course of the whole TA-21 building demolition was estimated at 0.0002 millirem. Since many of the process buildings would be decontaminated to unconditional release levels, and dust suppression using water sprays also would be required to reduce fugitive dust, this dose is considered bounding. In examining previous projects, air sampling conducted during the Building 3 and Building 4 South demolitions detected no radioactivity above background that was attributable to decommissioning.

All of the options would have some ongoing emissions during the period considered under this SWEIS, with the impacts being bounded by those present during past DP East and DP West process operations. Tritium outgassing from deactivated equipment in DP East and some additional emissions from the DP West facilities in surveillance and maintenance status would continue under all options. The TA-21 Complete DD&D Option and the Compliance Support Option would remove radioactive materials from buildings; while that process might temporarily increase emissions, it would actively reduce emissions over time.

Worker Health

The 6-year average collective total effective dose equivalent for the LANL worker population is 162 person-rem (LANL 2003a, 2004d, 2005d). In general, determining collective total effective dose equivalents for each TA is difficult because worker exposure data are collected at the group level, and members of many groups and organizations receive doses at several locations. The fraction of a group’s collective total effective dose equivalent coming from a specific Key Facility or TA can only be estimated. For example, health physics personnel and maintenance workers are distributed over the entire site, and these two occupational groups account for a significant fraction of the LANL total effective dose equivalent. This would also be applicable to workers previously conducting work at DP West who also worked on other environmental restoration and DD&D activities. Thus, relevant historical worker exposure is not readily available from LANL data on an activity-by-activity basis.

Although data to support quantitative values of worker dose by facility is not readily available, the relative dose workers receive can be predicted based on the specific considerations at TA-21. Office workers receive only ambient radiation doses. The radiological dose received by workers engaged in surveillance and maintenance activities at DP East and DP West radioactive facilities is relatively low because the radiation source terms have been largely removed and the time spent in the contaminated areas has shortened. Doses received by workers associated with tritium activities, including the deactivation of these facilities, would not be applicable as a baseline for comparison of options. Thus non-DD&D workers receive low exposures.

Workers conducting DD&D activities in production facilities that are contaminated with uranium, tritium, and transuranic isotopes receive both external and internal dose. The external dose, in the form of gamma or beta exposure, is modest during the deactivation element and continues to decrease as the higher levels of radioactivity and more contaminated equipment is removed from the buildings. The internal dose, which is received when radioactive contamination is inhaled or ingested, can be reduced through ventilation controls, stabilization of loose contamination, and the use of personal protective equipment. DD&D projects in DP West reported worker internal radiation doses averaging 2 millirem over the project (LANL 1995).

DD&D activities involve work with tools, cutting equipment, and often large hydraulic and construction equipment, and workers are exposed to potential accident conditions similar to those found on construction sites. These include cutting and pinching, work at elevated locations and in trenches or enclosed spaces, rigging, and working near large construction equipment. Additionally, there are industrial hygiene hazards, particularly those associated with old buildings, such as exposure to asbestos and transite, lead and other heavy metals, polychlorinated biphenyls, solvents and hazardous constituents, and biological hazards (such as hantavirus from mouse droppings). National safety statistics are used in this analysis because they provide a more conservative estimate than would DOE safety statistics.

DD&D Impacts—The principal impacts on worker health would result from the radiation dose workers receive during the execution of DD&D, industrial hygiene impacts due to exposure to asbestos and hazardous materials, and industrial accidents similar to those associated with routine construction.

Potential worker dose during the decontamination of the buildings can only be estimated, as each facility would have to be characterized before work planning could begin. Planning would support maintaining worker doses at an ALARA level. The collective worker dose would be greater than that received at present because DD&D workers would receive a greater dose than workers performing surveillance and maintenance activities, and a greater number of workers would be required. However, under the No Action Option, the liability of the contaminated building remains, and addressing that liability would eventually require workers to incur similar radiological doses. Based on these projects, worker exposures from the DD&D of TA-21 should be less than the LANL radiation worker 6-year average of 162 person-rem per year.

The demolition of the TA-21 buildings might also involve the removal of asbestos contaminated materials. Removal of asbestos-contaminated materials would be conducted according to LANL asbestos management programs, in compliance with strict asbestos abatement guidelines, and is regulated by New Mexico Environment Department under the provisions of NESHAPS. Workers would use personal protective equipment and other engineered and administrative controls. Reviews of historical documentation and characterization of facilities would also provide information on areas in buildings where hazardous material spills have occurred, and conditions that present additional industrial hygiene hazards to workers. Industrial hygiene hazards may be present in facilities in which there is no radioactive contamination; however, nonradiological facilities may allow greater use of large construction equipment, resulting in less direct worker contact with hazardous locations.

Construction accidents are a substantial worker risk in DD&D activities, which require the use of cutting and shearing electrical, pneumatic, and hydraulic tooling. Workers must address issues of working at elevated locations, on scaffolding, below grade, and in confined or atmospherically suspect areas, and address issues of rigging large equipment and electrical safety. These issues are addressed at LANL through the Integrated Safety Management process, including job characterization, work planning, and worker training. Special care is also necessary in work around large pieces of construction equipment. Since there is no DD&D activity associated with the No Action Option, the risk of construction accidents resulting in worker injury or death is greater in the TA-21 Complete DD&D Option and the Compliance Support Option. Based on the expected DD&D labor hours and national construction accident statistics, the DD&D of the TA-21 buildings could cause on the order of 11 recordable injuries. No construction fatalities would be expected using either of the statistical bases. Potential impacts from hazardous and toxic chemicals would continue to be prevented through the use of administrative controls and equipment.

Cultural Resources

The three general categories of cultural resources addressed in this section are archaeological, historic buildings and structures, and traditional cultural properties.

Archaeological and Historic Buildings and Structures. A cultural resource survey of TA-21 has identified 5 archaeological sites. These include a cavate, a rockshelter, trails and stairs, and a rock or wooden enclosure. The five sites are formally declared eligible or potentially eligible for listing on the National Register of Historic Places through consultation with the State Historic Preservation Office. Additionally, surveys of buildings and structures at TA-21 have determined that 15 buildings are National Register of Historic Places-eligible.

Traditional Cultural Properties. Traditional cultural properties are properties that are eligible for the National Register of Historic Places because of their association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining its cultural identity. There are no known traditional cultural properties located within TA-21; however, consultations with American Indian and Hispanic groups have not been conducted. Traditional cultural properties would not be anticipated in developed portions of the TA (DOE 1999c).

DD&D Impacts—DD&D of buildings and structures at TA-21 would not directly impact the five National Register of Historic Places-eligible or potentially eligible archaeological sites present within the area. DD&D of buildings and structures would have direct effects on 15 National Register of Historic Places-eligible historic buildings and structures that are associated with the Manhattan Project and Cold War years at LANL.

Prior to any demolition activities taking place, DOE in conjunction with the State Historic Preservation Office, would implement documentation measures such as preparing a detailed report containing the history and description of the affected properties. These measures would be incorporated into a formal Memorandum of Agreement between DOE and the New Mexico Historic Preservation Division to resolve adverse effects to eligible properties. The Advisory Council on Historic Preservation would be notified of the Memorandum of Agreement and would have an opportunity to comment.

Socioeconomics

Approximately 130 personnel are currently located in TA-21 facilities, along with additional seasonal employees or summer students. These personnel support environmental and other LANL programs and maintenance and warehousing functions for the LANL maintenance contractor.

DD&D Impacts—Socioeconomic impacts could result from the TA-21 DD&D action, including impacts on:

- LANL contractor and subcontractor employment;
- Potential employment from business using additional conveyed land (previously discussed in the *TA-21 Conveyance and Transfer EIS* [DOE 1999c]); and
- Private enterprises located on and adjacent to the DP Mesa.

Both the TA-21 Complete DD&D Option and the Compliance Support Option would remove most of the office space that these organizations currently use. However, since the programs and functions would still be required after the DD&D of TA-21, the majority of the personnel would be relocated to other buildings owned or leased by LANL, with little resulting effect to overall LANL employment. The 30 personnel who support TA-21 tritium operations would be relocated regardless of the TA-21 DD&D option.

Any employment from DD&D activities would be modest and temporary, with a maximum onsite DD&D workforce of fewer than 100 workers. Additionally, LANL has an ongoing program to remove excess facilities; the intermittent DD&D activity at the DP West Site over the last several years was funded and managed as part of this program. Although the DD&D of TA-21 would require DD&D workers at TA-21, this would not necessarily increase the overall number of DD&D workers. Any DD&D funding not used for TA-21 buildings would be available for DD&D projects in other TAs. The impacts of TA-21 DD&D would not directly translate into increases or decreases in overall DD&D employment.

Several of the tracts at the western end of TA-21 adjacent to the land on DP Road currently in commercial use have been (or are anticipated to be) conveyed to Los Alamos County. These tracts provide undeveloped areas close to the Los Alamos townsite available for future development unencumbered by the issues associated with “brownfield” areas. Current plans allow for the possibility that portions of the largest tract (TA-21-2/A-16), which contains the DP East and DP West and most of the TA-21 areas, may be made available for industrial use after remediation. Given the current level of planning detail for both the DD&D and remediation approach and the remediation schedule showing completion by 2011, the socioeconomic impacts from associated future development cannot be accurately predicted and would likely occur after 2011.

Private businesses located on the DP Mesa and adjacent to DP Road could incur modest but not irreparable impacts from the TA-21 DD&D. Waste disposal DD&D activities would result in an average of fewer than 10 one-way trips (and 10 empty return trips) per day between 2006 and 2011 on DP Road and onto State Road 502. This would not be a significant increase in traffic compared to current operations on either of these roads. The DD&D of contaminated facilities would take place at least 500 yards (457 meters) from the businesses, sufficient distance to mitigate any fugitive dust or project infrastructure impacts.

Waste Management

LANL tracks its waste generation by “Key Facility” in the following categories: transuranic (including mixed transuranic), low-level radioactive waste, mixed low-level radioactive waste, and a category of chemical waste that includes hazardous and toxic waste and construction and demolition debris. Historical chemical and radioactive waste generation information is provided in **Table H–11** for TA-21.

Due to its limited activity, TA-21 has generated relatively little waste over the past five years. The DP East buildings are considered part of the Tritium Key Facilities, as are the Weapons Engineering Tritium Facility and other facilities in TA-16. While the quantity of waste shown for the Tritium Facilities in Table H–11 is conservative because it includes contributions from both TA-16 and TA-21, it provides an indication of the waste types and a bounding limit on waste quantities. Sanitary (solid) waste, and uncontaminated construction and demolition debris generated at TA-21 was disposed of at the Los Alamos County Landfill. Recent environmental restoration activities in TA-21 have been limited to investigation and minor source removal actions; the only reported waste was 10.5 cubic yards (8 cubic meters) resulting from a removal action and site restoration conducted at Solid Waste Management Unit 21-024(f) (LANL 2004d). The wastes generated by the DD&D project to remove the south portions of Building 21-3 and Building 21-4 in the 1990s is shown in Table H–11 as an example of quantities and types of waste generated during a previous small DD&D project. The area of the buildings removed as part of this project represents between 6 percent and 9 percent of the area of the facilities that currently remain at TA-21.

Table H–11 Waste Generation Ranges and Annual Average Generation Rates from Technical Area 21 Facilities

		Tritium Facilities (annual rates)	*TA-21 Building 3 and Building 4 South Project, (1992-1995)*
Low-level Radioactive Waste (cubic yards)	Range	1 to 143	Not applicable
	Average	77	3,360
Mixed Low-level Radioactive Waste (cubic yards)	Range	0 to 2	Not applicable
	Average	0.7	Not applicable
Chemical Waste (pounds)	Range	22 to 11,385	Not applicable
	Average	3,466	1,790
Liquid Waste from TA-21-0257 (gallons)	Range	6,600 to 121,000	Not applicable
	Average	32,000	Not applicable

TA = technical area.
Notes: To convert pounds to kilograms, multiply by 0.45359; cubic yards to cubic meters, multiply by 0.76456; gallons to liters, multiply by 3.78533.
Sources: LANL 1995, 2003b, 2004b.

Liquid sanitary wastes generated from all TA-21 facilities are treated at the TA-46 Sanitary Wastewater Systems Plant. Building 21-0257, which has historically treated all liquid radioactive wastes generated by the DP West and DP East process facilities, is currently being maintained in a standby condition to allow pretreatment of any liquid radioactive wastes that would be generated from the deactivated facilities. After deactivation is complete, such waste is expected to be minimal, and it is unlikely that any DD&D-generated liquids will require processing in Building 21-0257. Table H–10 provides the range and average liquid radioactive waste volumes pretreated at Building 21-0257.

DD&D Impacts—The DD&D of TA-21 buildings and structures would generate a substantial volume of waste, and a principal project effort would be characterizing, packaging, handling, and disposing of waste materials. Initial planning efforts for the DP Site DD&D project have developed preliminary waste estimates. Dimensions of existing building components along with projections of contamination levels and packaging efficiencies were used to estimate waste volumes by waste type. As additional characterization data and planning information becomes available these estimates would be updated to refine the waste types and quantities, determine container types and quantities, and estimate levels of waste radioactivity. The waste estimate values for both of the TA-21 DD&D action options are provided in **Table H–12**.

DOE has developed extensive liquid and solid waste management infrastructures at LANL with capabilities to characterize, process, package, store, and manage all of the waste types that would be generated during the DD&D of TA-21. NNSA has the capability to treat and dispose of some wastes onsite but in other cases uses permitted offsite facilities for treatment and disposal. The two largest-volume waste types expected to be generated by the DD&D of TA-21 are solid low-level radioactive waste and nonradioactive construction debris. NNSA plans on using a combination of onsite disposal and offsite disposal to disposition low-level radioactive waste to minimize the impact of the large volume of DD&D waste that this project, and other projects would generate.

Table H–12 Waste Generation under the Proposed Action and Compliance Response Alternatives

	Tritium Facilities (nominal average yearly generation)	*TA-21 Complete DD&D Option*	*Compliance Support Option*
Low-level Radioactive Waste	77 cubic yards	35,000 cubic yards	35,000 cubic yards
Bulk Low-level Radioactive Waste [b]	Not available	26,000 cubic yards	26,000 cubic yards
Packaged Low-level Radioactive Waste [b]	Not available	8,700 cubic yards	8,700 cubic yards
Mixed Low-level Radioactive Waste (RCRA/TSCA constituents; not radioactive asbestos is considered low-level waste)	0.7 cubic yards	65 cubic yards	65 cubic yards
Transuranic Waste [a]	0.0	1.3 cubic yards	1.3 cubic yards
Solid Waste (nonradioactive construction debris and sanitary waste)	Not available	48,000 cubic yards	19,000 cubic yards
Chemical Waste (asbestos and hazardous)	1.6 cubic yards	440 cubic yards	440 cubic yards
Liquid Waste Pretreated at TA-21-0257	32,000 gallons	8,000 gallons	5,700 gallons

TA = technical area; DD&D = decontamination, decommissioning, and demolition; RCRA = Resource Conservation and Recovery Act; TSCA = Toxic Substances Control Act.

[a] Includes transuranic and mixed transuranic waste; all of the TA-21 transuranic waste would be "contact-handled" with no generation of transuranic "remote handled" waste.

[b] The low-level radioactive waste total has been subdivided into "bulk" and "packaged" components. The bulk waste is typically lower-activity radioactive building debris transported in intermodal containers and lift liners. The packaged waste is typically the higher-activity (>10 nanocuries per gram) materials and equipment packaged in "strong-tight" or "Type A" containers.

Notes: To convert cubic yards to cubic meters, multiply by 0.76456; gallons to liters, multiply by 3.78533. All numbers rounded to two significant figures.

The Los Alamos County Landfill is expected to close in 2007. A new transfer station, operated by the County, will be used to sort and ship sanitary waste and uncontaminated debris to a landfill or recycling facilities outside the county. NNSA would also recycle as much of these materials as possible. Debris concrete may be crushed and used as fill material in lieu of importing clean fill soil and uncontaminated metal may be recycled as scrap. For the purposes of the analysis, Table H–12 conservatively assumes all of the debris is disposed of as waste.

All other wastes expected to be generated by the DD&D activities would be handled, managed, packaged, and disposed of in the same manner as the same wastes generated by other activities at

LANL. Piping and other materials that are characterized as transuranic waste would be packaged in accordance with WIPP Waste Acceptance Criteria and the appropriate LANL procedures, transferred to Area G for storage, and ultimately shipped to the WIPP near Carlsbad, New Mexico. Any radioactive materials that are characterized as mixed low-level radioactive waste may be stored onsite at Area TA-54 pending identification of an offsite treatment and disposal facility. Most mixed low-level radioactive waste generated at LANL is sent offsite to other DOE or commercial facilities for treatment and disposal.

Asbestos contaminated with radioactive material could be disposed of in a disposal cell in Area G that is dedicated to the disposal of radioactively contaminated asbestos waste or alternatively packaged and disposed of offsite according to the receiving facility waste acceptance criteria. Asbestos waste that is not radioactively contaminated that is generated during the DD&D activities would be packaged according to applicable requirements and sent to the LANL asbestos transfer station for shipment offsite to a permitted asbestos disposal facility along with other asbestos waste generated at LANL.

Any hazardous waste generated during the TA-21 DD&D activities would be handled, packaged, and disposed of according to LANL's hazardous waste management program. These amounts are expected to be small and would be well within the capacity of LANL's hazardous waste management and disposal program.

Radioactive liquid waste would be transferred to the Radioactive Liquid Waste Treatment Facility in TA-50 at LANL for treatment. The liquid waste from the DD&D activities for TA-21 would be within the treatment and disposal capacity of the Radioactive Liquid Waste Treatment Facility. No effect on the Radioactive Liquid Waste Treatment Facility is anticipated.

The major difference between the TA-21 DD&D options is that the solid debris in the TA-21 Complete DD&D Option is about four times of the solid debris waste in the Compliance Support Option due to the fewer buildings demolished. The asbestos waste would probably also be higher for complete DD&D; however, without characterization data on the buildings it is unclear which of the additional buildings would be expected to contain asbestos. The availability of asbestos removal contractors and asbestos disposal locations should not become a constraint.

Transportation

Several types of transportation impacts result from current TA-21 activities: automobile traffic on and off of the LANL facility, and truck traffic, particularly associated with maintenance and logistics activities. These vehicles need to pass through the Los Alamos townsite to reach other LANL TAs. This level of activity is consistent with an operating facility environment. There has historically been intermittent truck traffic associated with waste from DD&D of facilities at DP West.

DD&D Impacts—There are several types of temporary and permanent transportation impacts that could result from alternatives at TA-21. These include changes in automobile traffic patterns on and off of the LANL facility and changes in truck traffic patterns, particularly for transporting waste. While there might be minor changes in traffic patterns between options based on changes in number and locations of jobs and temporary increases in DD&D activities, the impact of a few hundred workers would be minor within the total LANL workforce.

Local traffic resulting from TA-21 DD&D activities, including worker commutes, equipment movement, and waste transportation, should not be appreciably greater than that which occurred during past operations. When combined with the traffic from concurrent remediation activities, the cumulative traffic would not result in local traffic exceeding normal volume for commercial areas, although there might be some intermittent periods of traffic congestion. The number of DD&D workers at TA-21 likely would be less than the current TA-21 staff. While the remediation option under the Consent Order for TA-21 has yet to be determined, even the most extensive remediation option would be less than 500 workers. The construction equipment may be staged at TA-21, so its movement along public roads would be mostly during project mobilization and demobilization. The traffic impacts from the waste transportation would vary between about 1,000 and 1,500 trips per year for 2006 to 2010, which would average less than 20 one-way trips per day. Even remediation options that would result in several times greater truck traffic would still be consistent with acceptable commercial area traffic levels.

The effects from incident-free transportation of DD&D wastes under both the offsite disposal and onsite disposal options, for the worker population and the general public are presented in **Table H–13**. The effects are presented in terms of the collective dose in person-rem resulting in excess LCFs. Excess LCFs are the number of cancer fatalities that maybe attributable to the proposed project that are estimated to occur in the exposed population over the lifetime of the individuals. If the number of LCFs is less than one, the subject population is not expected to incur any LCFs resulting from the actions being analyzed. The risk for development of excess latent cancer fatalities is highest for workers under the offsite disposition option because of the duration of exposure during transport.

Table H–13 Incident-Free Transportation Impacts – Technical Area 21 Decontamination, Decommissioning, and Demolition

Disposal Option	*Low-level Radioactive Waste Disposal Location* [a]	*Crew*		*Public*	
		Collective Dose (person-rem)	*Risk (LCFs)*	*Collective Dose (person-rem)*	*Risk (LCFs)*
Onsite Disposal	LANL TA-54	0.30	0.0002	0.06	0.00004
Offsite Disposal	Nevada Test Site	9.37	0.006	2.71	0.002
	Commercial Facility	9.07	0.005	2.65	0.002

rem = roentgen equivalent man, LCF = latent cancer fatality, TA = technical area.
[a] Transuranic wastes are disposed at WIPP.

The traffic accident impacts from transportation of DD&D wastes for both offsite disposal and onsite disposal are presented in **Table H–14** as traffic accidents, population dose due to accidental release of radioactivity, and fatalities due to traffic accidents from both the collisions and excess LCFs. The analysis assumed that all generated nonradiological wastes would be transported to offsite disposal facilities.

Table H–13 and Table H–14 indicate that no excess fatal cancers or fatalities would likely occur from DD&D activities in TA-21.

Table H–14 Transportation Accident Impacts – Technical Area 21 Decontamination, Decommissioning, and Demolition

Low-level Radioactive Waste Disposal Location [a, c]	*Number of Shipments* [b]	*Distance Traveled (million kilometers)*	*Accident Risks*	
			Radiological (excess LCF)	*Traffic (fatalities)*
LANL TA-54	4,852	1.23	1.7×10^{-11}	0.015
Nevada Test Site	4,852	6.42	2.8×10^{-7}	0.066
Commercial Facility	4,852	5.90	2.1×10^{-7}	0.061

LCF = latent cancer fatality, TA = technical area.
[a] All nonradiological wastes would be transported offsite
[b] Only 22 percent of shipments are radioactive wastes, others include 77.5 percent for industrial and sanitary waste, and about 0.05 percent asbestos and hazardous wastes.
[c] Transuranic wastes are disposed at WIPP.

H.2.3.3 Compliance Support Option – Decontamination, Decommissioning, and Demolition to Support the Consent Order Activities

Land Resources

Land Use

Following DD&D of selected buildings and structures within TA-21, the site (except parcel A-15-1 which has been transferred to Los Alamos County) would remain under the control of DOE. Any potential development would have to address structure reuse or DD&D. Land use designations would remain unchanged.

Visual Environment

The more limited DD&D activities of this option would have short-term adverse impacts on visual resources due to the presence of heavy equipment and an increase in dust. Since many buildings would remain within TA-21, only limited areas would be contoured and revegetated. Although some of the larger buildings would be removed, the view of the TA from State Route 502 and from higher elevations to the west would still include portions of the current mix of 50-year old structures.

Geology and Soils

Under all options, the impact of a seismic event has been reduced by the deactivation of the DP East facilities and removal of a majority of the source material present. Since no new facilities would be constructed under the Compliance Support Option, there would be no new potential seismic impact.

The Compliance Support Option would have a minor impact on the geologic and soils resources at LANL as the affected facility areas are already developed and adjacent soils are already disturbed. The DD&D activities would introduce some additional ground disturbance in excavating foundations and establishing laydown yards and waste management areas near the facilities to be demolished. However, the impacts would be temporary and available paved surfaces, such as adjacent parking lots, would be used to mitigate any impact. The degree of soil disturbance from the Compliance Support Option is expected to be much smaller than that resulting from major remediation activities under the Consent Order. The primary indirect impact would be associated with the need to excavate any contaminated tuff and soil not addressed by the Consent Order from beneath and around facility foundations. Borrow material (such as crushed tuff and soil) would be required to fill the excavations to grade. Such resources are available from onsite borrow areas (see Section 5.2).

Water Resources

Similar to the No Action Option, the Compliance Support Option would have a negligible impact on water resources, due to the elimination of the Tritium Science and Fabrication Facility outfall, which discharges less than three percent of the effluent in Los Alamos Canyon. The impact on water resources for dust suppression and decontamination is similar but less extensive in this option than in the TA-21 Complete DD&D Option; no significant effect on water resources is anticipated. The option would not result in the disturbance of watercourses or generation of liquid effluents that would be released to the surrounding environment. Relocation of office personnel would be minimal in comparison to complete DD&D, and best management practices would be used to control stormwater runoff and water used for dust suppression.

Air Quality and Noise

Air Quality

Nonradioactive Emissions. In the Compliance Support Option, similar to the TA-21 Complete DD&D Option, the operational emission sources would be relocated or cease as the activities are relocated and the buildings demolished. There would be temporary increases in vehicle exhaust and fugitive dust during the actual building demolition. Initially, air emissions from TA-21 would be similar to the current emissions. The emissions from the laboratory use of various toxic chemicals should be eliminated as the process buildings are placed into surveillance and maintenance status and subsequently demolished. However, the nonradioactive air pollutant emissions from the three natural gas-fired boilers in Building 21-0357 and the vehicle exhaust and emissions from activities in the maintenance facilities operated by the LANL maintenance contractor would remain.

Similar to the TA-21 Complete DD&D Option, the DD&D of the buildings and structures would result in temporary increases in air quality impacts from construction equipment, trucks, and employee vehicles. The relative quantities of the solid waste may be used to estimate the magnitude of demolition and hence the potential for dust generation. The Compliance Support Option would be expected to generate on the order of 70 percent as much dust as the TA-21 Complete DD&D Option.

Radioactive Emissions. The Compliance Support Option would have radiological emissions quantitatively similar to those of the TA-21 Complete DD&D Option, since all of the identified contaminated structures are within the scope of each option. Radiological emissions during surveillance and maintenance and initial DD&D would result from the exhaust of building or temporary ventilation systems used for dust and contamination control. Structural surfaces would be either decontaminated to unconditional release levels or with selected contaminated surfaces stabilized to permit segregation of radioactively contaminated and uncontaminated debris after demolition. Small quantities of radioactivity associated with the dust emissions would result from demolition activities. The potential exists for contaminated soils, building debris, and possibly other media to be disturbed during demolition of facilities. Release of radioactivity would be minimized by proper decontamination of buildings prior to demolition. Such emissions are typically of short duration and are monitored and addressed in regulatory documents. Doses to the public and workers are discussed in the section on human health.

Noise

Noise levels during demolition activities for both the Compliance Support Option and the TA-21 Complete DD&D Option would be consistent with those typical of construction activities. Impacts on the public and wildlife would be similar as well.

Ecological Resources

As in the TA-21 Complete DD&D Option, wildlife in canyons adjacent to TA-21 would be intermittently disturbed by construction activity and noise over the demolition period; however the impacts would be smaller and confined to more localized areas. The revegetation following the DD&D of buildings and structures within TA-21 would be more localized as would the redevelopment impact on wildlife. However, the impact from environmental restoration activities would be similar between options, and possibly larger than that of facility DD&D. Impacts on the Mexican spotted owl, and activities to mitigate those impacts would be similar between options.

Since there are no wetlands in TA-21, DD&D activities would not affect this resource. One of the two NPDES-permitted outfalls associated with TA-21 operations would be eliminated, and the quantity of surface water discharged to the adjacent canyons from the Steam Plant outfall should be reduced from the present levels as a result of the relocation of tritium operations.

Human Health

The Compliance Support Option includes the DD&D of the buildings and structures at TA-21 necessary to support the environmental remediation activities. The primary human health impacts from the Compliance Support Option are those to the public due to radiological emissions and worker health and safety. Precautions taken to assure the protection of workers from industrial hygiene hazards (for example, asbestos removal) would ensure there would be minimal chemical or asbestos emission that could impact the public.

Public Health. The radiological emissions from the TA-21 facilities under the Compliance Support Option, as in the TA-21 Complete DD&D Option, include continued emissions from surveillance and maintenance buildings until in-building DD&D activities are complete and the short-term emissions that result from residual contamination becoming airborne during structural demolition. Since the identities of the radiological facilities and the methods and schedule to DD&D those facilities is similar to complete DD&D, the dose to the public should be bounded.

Worker Health. The principal impacts on worker health under the Compliance Support Option are similar to those in the TA-21 Complete DD&D Option. The impacts result from the radiation dose workers receive during the execution of DD&D, industrial hygiene impacts due to exposure to asbestos and hazardous materials, and industrial accidents similar to those associated with routine construction. As discussed above in reference to the public dose, since the DD&D facilities and methods are similar between options, the radiological dose received by the DD&D workers should also be similar.

The demolition of the above buildings might also involve the removal of some asbestos contaminated material. Additional industrial hygiene hazards and hazards from routine construction accidents occur in facilities in which there is no radioactive contamination; however, nonradiological facilities may allow greater use of large construction equipment, resulting in less direct worker contact with hazardous locations. The smaller number of facilities subject to DD&D under the Compliance Support Option suggests that the worker exposure to industrial and construction hazards would be reduced from those expected in the TA-21 Complete DD&D Option. Construction accidents and fatalities would be bounded by the values identified in the TA-21 Complete DD&D Option.

Cultural Resources

The DD&D of buildings and structures under the Compliance Support Option would not affect the five National Register of Historic Places-eligible archaeological sites at TA-21 but would have direct effects on 15 National Register of Historic Places-eligible historic buildings and structures that are associated with the Manhattan Project and Cold War years at LANL. Documentation measures would be implemented to reduce adverse effects to National Register of Historic Places-eligible properties at LANL and Memorandum of Agreement terms negotiated. This would also apply to the requirements for historic preservation defined in 36 CFR 800 during the transfer of land under Public Law 105-119.

Socioeconomics

The principle impacts of the Compliance Support Option would not change from the TA-21 Complete DD&D Option. This is largely due to the removal of office space that is currently used. These programs and their functions will be relocated to other available buildings that are owned or leased by DOE, with little effects to the overall LANL personnel, since the programs are still required.

Waste Management

For the Compliance Support Option, as for the TA-21 Complete DD&D Option, the waste types and quantities generated by removal of the structures would be within the capacity of existing waste management systems, and would not by themselves result in substantial impact to existing waste disposal operations. The waste types and volumes expected to be generated during the Compliance Support Option DD&D activities under the two disposal alternatives are summarized in Table H–12.

The Compliance Support Option would generate about 60 percent less solid debris than the TA-21 Complete DD&D Option because it demolishes fewer buildings. The asbestos waste would probably also be lower in the Compliance Support Option.

Transportation

As in the TA-21 Complete DD&D Option, the wastes generated during the DD&D activities would need to be transported to storage or disposal sites. These sites could be either at LANL or at an offsite location, although the impacts to the public are larger when wastes are shipped for offsite disposal. The largest categories of waste that would be generated from DD&D activities are low-level radioactive waste and solid sanitary waste or debris. Solid sanitary waste or debris may often be recycled as fill on the LANL site, reducing the actual waste quantity; solid waste that cannot be recycled can be disposed of at a New Mexico Subtitle D landfill. Possible offsite low-level radioactive waste disposal sites, in contrast, are located at the Nevada Test Site and a commercial facility in Utah.

Since the quantities of radioactive waste are similar between the Compliance Support Option and the TA-21 Complete DD&D Option, the risks to the public from both radiation dose and traffic accidents as shown in Table H–13 and Table H–14 are assumed to be the same. The tables address both the option for disposal of low-level radioactive and sanitary waste at onsite and offsite disposal facilities. The only difference in the impacts between the TA-21 Complete DD&D Option and the Compliance Support Option is a slightly reduced risk of accidents due to the reduced number of truck trips to the sanitary waste disposal facility. The radiological impacts would be identical.

H.3 Waste Management Facilities Transition Impacts Assessment

Section H.3 provides an assessment of environmental impacts for alternatives to the management of solid low-level radioactive waste, mixed low-level radioactive waste, hazardous and chemical waste, and transuranic waste that take into consideration the closure of TA-54 Area L and MDA L, and TA-54 Area G and MDA G. Closure of these areas is required by DOE Order 435.1 with corrective actions for certain units specified by the Consent Order (NMED 2005a) that was entered into by DOE, the University of California as the management and operating contractor, and the State of New Mexico, in March 2005. More detailed information regarding the Consent Order is presented in Section 2.2.6. Section H.3.1 provides background information for the actions needed to remove, replace and re-locate existing facilities that are used to store and process these solid waste streams, as well as the purpose and need. Section H.3.2 provides a brief description of the No Action Option and other proposed options. Section H.3.3 describes the affected environment and environmental impacts at the LANL technical areas associated with the options (TA-50, TA-54, and TA-63). Chapter 4 of this SWEIS presents a description of the overall affected environment at LANL. Any unique characteristics of these TAs and LANL not covered in Chapter 4 that would be affected by the proposed transition of waste management facilities are presented here.

H.3.1 Introduction and Purpose and Need for Agency Action

TA-54 provides storage, processing and disposal capabilities for mixed low-level radioactive waste (Area L), chemical and hazardous waste (Area L), low-level radioactive waste (Area G), and transuranic waste (Area G) that are generated by LANL programs. Due to the schedule for pending corrective actions at MDA L and MDA G per the requirements of the Consent Order, the following would need to occur by the end of 2015 and require NEPA analysis:

- Low-level radioactive waste support facilities currently located in Area G and MDA G would need to undergo DD&D and be moved or replaced so that low-level radioactive waste disposal operations can continue at LANL.
- Applicable mixed low-level radioactive waste storage structures and hazardous and chemical waste storage structures and operations in Area L that would otherwise prevent closure of subsurface units in Area L and MDA L would need to be closed and relocated.
- Transuranic waste[4] stored below-grade in Area G and MDA G would need to be retrieved, processed, and shipped for final disposal at the WIPP. This action would require the relocation and addition of processing capabilities for preparing transuranic waste for shipment, addition of retrieval capabilities for remote-handled transuranic waste, and the construction and operation of a Transuranic Waste Consolidation Facility in a location other than Area G and MDA G to process newly-generated waste.

Background

This section provides an overview of how low-level radioactive waste, mixed low-level radioactive waste, hazardous and chemical waste, and transuranic waste are currently managed. Some of these actions have been analyzed for environmental impacts in prior NEPA documentation, while other options need to be analyzed in this SWEIS. The overview of waste management practices that impact closure activities is divided into a discussion of legacy wastes and newly-generated wastes.

Legacy Waste. Legacy waste is waste that has been generated by past operations and has been in storage for many years. Mixed low-level radioactive legacy waste and hazardous and chemical legacy wastes are only temporarily stored in Area L for processing and shipment to offsite disposal facilities; therefore, the discussion of legacy waste in this appendix is specific to transuranic waste in Area G.

Legacy transuranic waste[5] is stored in fabric domes, trenches, pits and shafts. NNSA expects to characterize and prepare about 353,150 cubic feet (10,000 cubic meters) of contact-handled transuranic waste for shipment. About 296,650 cubic feet (8,400 cubic meters) of this waste is located in above-ground storage units and subsurface storage units at MDA G, and about 56,500 cubic feet (1,600 cubic meters) will be newly-generated in the future from other areas within LANL. Contact-handled transuranic waste is currently stored in the fabric domes, Trenches A-D, Pit 9, corrugated metal pipes on top of Pit 29, and Shafts 262-266. Remote-handled transuranic waste is stored in 55 shafts at Area G (LANL 2005b).

Some of the contact-handled transuranic waste in the fabric domes is currently being prepared for shipment to WIPP through the "Quick-to-WIPP" Program. In this program, approximately 2,000 high-wattage drums have been prioritized for accelerated characterization, certification, and

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[4] The term transuranic waste as used in Section H.3 includes mixed transuranic waste.
[5] Waste identified as legacy transuranic waste was originally placed into storage under the assumption that it met the definition of transuranic waste applicable at the time. All of this waste will be re-characterized to determine whether it meets the current definition of transuranic waste. It will be disposed of as transuranic waste or low-level radioactive waste based on the new characterization.

shipment as they contain almost 60 percent of the radioactive material-at-risk at Area G (LANL 2005b).

Facilities that currently support the processing and shipment of contact-handled transuranic waste to WIPP include the following:

- The Decontamination and Volume Reduction System. This system is located in Building 412 at Area G and provides processing capabilities to decontaminate large-sized storage packages and reduce the size of transuranic waste. This facility has been analyzed through NEPA (DOE 1999b).

- Waste Characterization, Reduction, and Repackaging facility. Located in TA-50, this facility receives waste transported by truck from Area G to be characterized (including equilibration and headspace gas analysis) and repackaged in a form suitable for eventual packaging into TRUPACT II containers. The repackaged containers are then transported by truck back to Area G for storage (NNSA 2003).

- Radioassay and Nondestructive Testing facility. Located in the western part of TA-54 (TA-54 West), this facility receives transuranic waste containers sent from Area G for configuring into payloads and loading into TRUPACT II containers, and shipping to WIPP (NNSA 2003).

To accelerate the processing of contact-handled transuranic waste from the fabric domes, DOE plans to install and operate three modular units at Area G to duplicate the capabilities provided by the Waste Characterization, Reduction, and Repackaging facility. In addition, processing functions would be consolidated in one of the large domes (such as Dome 375) to increase processing efficiency and speed. The net result is that 16 drums could be readied for shipment to WIPP in the same time that current operations at TA-50 can produce only one drum for shipment (DOE 2002a).

Transuranic waste in below-ground storage is found in the following locations (LANL 2005b):

- Trenches A-D. These trenches contain approximately 11,850 cubic feet (335 cubic meters) of contact-handled transuranic waste packaged within 30-gallon (114 liter) metal drums placed within concrete lined casks.

- Pit 9. This pit contains approximately 55,100 cubic feet (1,560 cubic meters) of contact-handled transuranic waste packaged within 30-, 55-, and 85-gallon (114-, 208-, 322-liter, respectively) drums and fiberglass-reinforced plywood boxes.

- Corrugated metal pipes on Pit 29. 158 corrugated metal pipes contain approximately 15,600 cubic feet (442 cubic meters) of contact-handled transuranic waste consisting of concreted wastewater treatment sludge.

- Shafts 262-266. These shafts contain approximately 247 cubic feet (7 cubic meters) of tritium-contaminated contact-handled transuranic waste. Each shaft contains a single stainless steel containment vessel designed for this waste.

- Shafts 302-306. These shafts contain approximately 1,800 cubic feet (51 cubic meters) of remote-handled transuranic waste consisting of hot cell liner boxes (decommissioned gloveboxes from LANL hot cells). The gloveboxes are packaged in steel boxes.

- Shafts 235-243 and 246-253. Each of these shafts contains a single 35 cubic foot (1 cubic meter) canister of remote-handled transuranic waste. Twelve of the canisters contain 1.5-gallon (6-liter) cans of waste packaged into 55-gallon (208-liter) drums, while the remaining five canisters contain large debris items and hardware in 55-gallon (208-liter) drums.

- Shafts 200-232. These shafts contain the highest activity remote-handled transuranic waste. There are approximately 950 cubic feet (27 cubic meters) of remote-handled transuranic waste consisting of hot cell debris packaged into one-gallon (4-liter) cans that were placed into the shafts. The waste in these shafts would be the most difficult to retrieve because of the high activity and the configuration of the cans.

Structures and processes for shipping contact-handled transuranic waste stored in the above-ground fabric domes to WIPP have been analyzed through the NEPA process in the *1999 SWEIS* (DOE 1999a) and related Supplement Analysis (DOE 2002a) and the Environmental Assessment prepared for the Decontamination and Volume Reduction System (DOE 1999b), however, the retrieval and processing of transuranic waste in below-ground storage requires analysis through the NEPA process.

Newly-Generated Waste. Newly-generated waste is waste that has been generated since October 1998. Newly generated waste considered in this appendix primarily addresses hazardous and chemical waste and mixed low-level radioactive waste operations currently in Area L, and low-level radioactive waste and transuranic waste operations currently in Area G.

- *Transuranic Waste*—Transuranic waste continues to be generated as LANL carries out its research and production missions. NNSA would continue to store and process newly-generated transuranic waste using the processes described for dispositioning legacy wastes.

- *Low-level Radioactive Waste*—The *1999 SWEIS* analyzed the expansion of low-level radioactive waste disposal operations from currently operational portions of Area G to Zone 4 of TA-54. Zone 4 is located adjacent to, and west of, the current operational portion of Area G. An access control and monitoring building, a characterization and verification building, and a compactor located in Area G currently support these operations.

- *Mixed Low-level Radioactive Waste and Hazardous and Chemical Waste*—Storage structures are currently located in Area L for storage of mixed low-level radioactive waste and hazardous and chemical waste prior to this waste being shipped offsite for treatment and disposal. NNSA would continue to generate mixed low-level radioactive waste and hazardous and chemical waste.

Purpose and Need

The mission of LANL is to help ensure the safety and reliability of the nuclear weapons in the United States stockpile, prevent the spread of weapons of mass destruction and to protect the Nation from terrorist attacks (LANL 2005a). Activities associated with accomplishing these missions generate solid wastes that include low-level radioactive waste, mixed low-level radioactive waste, hazardous and chemical wastes, and transuranic waste. Facilities that are necessary to manage these waste streams encompass transportation, storage, processing and disposal. Most of these waste management operations are located in TA-54 Area L and Area G, where operations have been conducted since 1959 and 1957, respectively (LANL 2005b).

Operations in Area L currently involve storage of mixed low-level radioactive waste and hazardous and chemical wastes in container storage units, which are subject to Resource Conservation and Recovery Act (RCRA) permit or interim status requirements. Past operations include the subsurface disposal of non-radioactive liquid chemical waste in pits, shafts and impoundments. Operations in Area G currently consist of processing and disposal of low-level radioactive waste, storage of transuranic waste in above-ground fabric domes and below-ground trenches, pits and shafts, processing of the transuranic waste stored in the fabric domes, and shipment of this waste to a disposal site.

Some of the burial areas in Area L and Area G are considered solid waste management units subject to corrective action requirements and some are disposal units subject to Resource Conservation and Recovery Act closure and post-closure care requirements. The New Mexico Environment Department, DOE, and the University of California entered into a Consent Order for corrective action on March 1, 2005, which requires closure of the affected areas (referred to as MDA L and MDA G in the corrective action program) by December 31, 2010 for MDA L and December 29, 2015 for MDA G (NMED 2005a, LANL 2005b). The New Mexico Environment Department intends to simultaneously issue two hazardous waste permits that will include closure and post-closure requirements; one for active storage and treatment units and the second for interim status disposal units that are no longer active (NMED 2005b).

In Area L, NNSA needs to remove several container storage units for storage of mixed low-level radioactive waste and chemical and hazardous waste so that closure activities can be completed. LANL needs to determine the impacts associated with removing these container storage units and consolidating storage operations in Area L or other locations at LANL.

In Area G, NNSA needs to complete or move all storage operations and processing of transuranic waste for shipment to WIPP for disposal so that closure activities can be completed in compliance with the Consent Order. Impacts from processing and shipping transuranic waste currently stored in the fabric domes are analyzed in the *1999 SWEIS* and related Supplement Analysis of the *1999 SWEIS*. Retrieval and processing of the transuranic waste stored below-ground in trenches, pits and shafts, however, needs to be analyzed under NEPA so that a preferred option can be selected. In addition, inspection, characterization and verification, and repackaging facilities and equipment are needed to accelerate the processing and shipment of transuranic waste stored above-ground, and to address the management of newly-generated transuranic waste once operations in Area G cease. A new facility is needed to store, process and disposition newly-generated transuranic waste that will be created in support of LANL's mission after Area G and MDA G are closed. In addition, NNSA needs to remove and replace low-level radioactive waste processing facilities located in Area G to allow closure activities to be completed and to allow continuation of low-level radioactive waste disposal in support of LANL's mission.

H.3.2 Options Description

The No Action Option and two other options are considered. The No Action Option is incorporated into the No Action Alternative as presented in Chapter 3. Two other options are presented that are incorporated into the Expanded Operations Alternative – Option 1: Accelerated Actions for Meeting the Consent Order, and Option 2: Interim Actions Necessary for Meeting the Consent Order.

H.3.2.1 No Action Option

In this option, no new action would be taken. Operation of existing radiological and nonradiological processes would continue in Areas L and G based on NEPA coverage provided prior to the issuance of this SWEIS. Specifically, the following would occur:

- Contact-handled transuranic waste stored at Area G in fabric domes would be retrieved and processed using existing facilities (that is, the Decontamination and Volume Reduction System, Waste Characterization, Reduction, and Repackaging facility, and Radioassay and Nondestructive Testing facility), and modular units.

- All transuranic waste stored in below-ground facilities would not be retrieved for processing and eventual shipment to WIPP.

- Newly-generated transuranic waste would continue to be stored, processed and shipped using current facilities in Area G, the modular units, the Waste Characterization, Reduction, and Repackaging facility, and the Radioassay and Nondestructive Testing facility.

- Low-level radioactive waste processing facilities and operations (that is, an access and control monitoring building and entrances, a characterization and verification building, a compactor facility and disposal areas) currently located in Area G (including Zone 4) would continue to be used as part of low-level radioactive waste disposal operations.

- All structures and processes currently located in Area L would remain with no changes to the footprint or operations.

H.3.2.2 Option 1: Accelerated Actions for Meeting the Consent Order

For Option 1, NNSA would retrieve, process, and transport for disposal all wastes stored in facilities in Area L and MDA L, and Area G and MDA G, that need to be removed for closure activities; and remove, re-locate, and replace applicable facilities. Specific activities associated with Option 1 are described in Sections H.3.2.2.1 – H.3.2.2.5.

H.3.2.2.1 Remote-Handled Transuranic Waste Retrieval Facility

NNSA would construct and operate a remote-handled transuranic waste retrieval facility at Area G for the sole purpose of retrieving and processing remote-handled transuranic waste from Shafts 200-232. This facility would provide remote capabilities to retrieve the remote-handled transuranic waste from the shafts.

A RCRA permit modification approval by the New Mexico Environment Department would be needed for the construction of this facility because mixed transuranic waste would be stored at the site. During the permit modification approval process, additional operating and safety procedures may be implemented based upon conditions added by the regulatory agency and from the public comment process.

NNSA would design this facility to Hazard Category 3 or Radiological Facility requirements and construct it in accordance with DOE and LANL standards. Construction of the facility would disturb about one-quarter acre (0.1 hectare) with the building taking up approximately 5,000 square feet (464 square meters), or about one-third of the floor space currently used for the Decontamination and Volume Reduction System (LANL 2006).

NNSA would construct a remote-handled transuranic waste retrieval facility on the following schedule (LANL 2005b):

- Plan: start by 4/3/2006; complete by 9/26/2007.
- Design: start by 10/1/2007; complete by 9/30/2009.
- Build: start by 10/1/2009; complete and become operational by 9/30/2011.

The remote-handled transuranic waste retrieval facility would be closed under the hazardous waste facility permit, and would undergo DD&D by 2015 upon completion of remote-handled transuranic waste removal from Area G. If permitted, the facility cannot undergo DD&D without completing closure by decontamination and removal of all wastes and waste residues. All empty shafts would remain in the ground to be incorporated into the Area G and MDA G closure.

H.3.2.2.2 Transuranic Waste Consolidation Facility

Operations at LANL would generate transuranic waste once Area G and MDA G are closed. LANL programs that currently generate transuranic waste include (Bachmeier 2005):

- Pit manufacturing and stockpile stewardship.
- Mixed oxide fuel research and development.
- Vault disposition programs.
- Plutonium-238 clean-up and stabilization.
- Actinide research and development.

- TA-18 inventory reduction.
- Offsite Source Recovery Project.

A new Transuranic Waste Consolidation Facility would therefore be needed to replace current capabilities at Area G for storing, processing, and shipping newly generated transuranic waste. Based on pre-conceptual analysis, the Transuranic Waste Consolidation Facility would be sized for a throughput of up to 1,000 drum equivalents per year, plus approximately 600 cubic feet (17 cubic meters) large items (such as gloveboxes) per year. An additional contingency capacity of 500 drum equivalents per year is being considered to accommodate fluctuations throughout the waste management chain from LANL to WIPP. The facility (which may be comprised of 2 to 4 separate buildings) would be approximately 30,000 to 40,000 square feet (2,790 to 3,720 square meters) and would require a 2 to 4 acre (1.2 to 1.6 hectare) site (Vance 2005).

The facility would accommodate the following functions (LANL 2006):

- Staging and Storage (10,000 to 15,000 square feet [930 to 1,390 square meters] for storage of up to 1,500 drums of transuranic waste).
- Characterization, Certification, and Repackaging consisting of approximately 10,000 square feet (930 square meters).
- Decontamination and Size Reduction consisting of approximately 5,000 square feet (465 square meters).
- Utilities and Support (including office and technical support space) consisting of approximately 5,000 square feet (465 square meters).
- Shipping (for example, TRUPACT II loading operations) consisting of approximately 5,000 square feet (465 square meters).

It is anticipated that the nuclear portions of the facility (those areas or buildings where drum handling or waste processing occurs) would be designed and constructed to Hazard Category 2 and Performance Category 3 requirements. Other portions of the facility, such as office spaces, would be designed to more conventional standards and would be appropriately separated from nuclear functions. All facilities would be designed and constructed in accordance with applicable requirements and standards.

The Transuranic Waste Consolidation Facility would contain systems similar to the Perma-Con® containment system (NFS 2005) to enclose a waste staging area, waste characterization equipment, decontamination equipment, or other associated systems. A comparable system for the new facility would include access ports, airlocks, the capability for supplying air to suited workers requiring access to the inner structure, and an overhead crane. Nuclear portions of the facility that require confinement ventilation systems would employ negative pressure and high-efficiency particulate air filtering systems for air treatment. Air would be discharged through a stack following high-efficiency particulate air filtration.

The floor would be constructed as a concrete pad covered with a material such as stainless steel or a sealant for contamination control. The pad would divert any liquids inadvertently introduced to the structure to a sump so that the liquids can be recovered, treated, and appropriately disposed.[6]

The facility would be connected to LANL site water, electricity, phone, and other utilities, and would be equipped with fire suppression, emergency communications, and other safety systems, including continuous air monitors, criticality monitors, fixed air samplers, a surrounding fence and controlled access.

A RCRA permit modification approval by the New Mexico Environment Department would be needed for the construction of this facility because mixed transuranic waste would be stored at the site. During the permit modification approval process, additional operating and safety procedures may be implemented based upon conditions added by the regulatory agency and from the public comment process.

NNSA is evaluating two sites for constructing and operating the facility. These include a site at TA-50 (adjacent to the intersection of Pajarito Road and Pecos Road) and a site near TA-63 (at the intersection of Pajarito Road and Puye Road). Both sites are between 2 and 4 acres (0.8 and 1.6 hectares) and are relatively close to TA-55, the facility that generates the majority of the transuranic waste at LANL. Other sites would be considered if these two sites are found to be unsuitable during conceptual design development.

Design of the Transuranic Waste Consolidation Facility would begin in 2008, with construction commencing in 2010. A permit modification request would be submitted to the New Mexico Environment Department in 2009, which would need to be approved prior to construction. Startup would occur in late 2011 and operations would commence in 2012 (LANL 2005b). The facility would have a design life of 30 to 35 years.

H.3.2.2.3 Other Transuranic Waste Processing Needs

Additional equipment and facilities for accelerating the processing of contact-handled transuranic waste stored at Area G are needed and would be consolidated in one of the large domes (such as Dome 375). The additional equipment and facilities include the following (LANL 2005b):

- An IQ3 unit to replace the Fixed-Energy Response Function Analysis with Multiple Efficiency system and tomographic gamma scanner unit for performing quantitative assays to segregate low-level radioactive waste from the transuranic waste and determine plutonium isotopic characteristics and other transuranic isotope ratios.
- SuperHENC or multiple purpose crate counter to conduct standard waste box assays.
- An additional Perma-Con® containment system in Dome 224 for visual examinations, prohibited item disposition, and repackaging of drums.

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[6] *It is assumed that waste acceptance criteria for the facility would include requirements to limit the quantities of free liquids that might be in received waste.*

- Mobile Visual Examination and Repackaging for visual examinations, prohibited item disposition, and repackaging of drums.
- Modular Repackaging unit for visual examinations, prohibited item disposition, and repackaging of drums.
- Decontamination and Volume Reduction System upgrades to a Hazard Category 2 facility to process oversize crates and fiberglass-reinforced plywood boxes.
- MART washers re-installation in Dome 33.
- A diamond saw or similar type cutting system in the Decontamination and Volume Reduction System to cut corrugated metal pipe into lengths that can be packaged into standard waste boxes.
- A TRUPACT II loading and shipping area in Area G that would be used to load TRUPACT II containers for shipment to WIPP.

These additional equipment and facilities would allow the replacement of the Waste Characterization, Reduction, and Repackaging facility and Radioassay and Nondestructive Testing facility processing capabilities and eliminate shipments between Area G and these two facilities.

Different shafts store different forms of remote-handled transuranic waste, as described in Section H.3.1. NNSA would perform the following for the different transuranic waste forms by 2015 (LANL 2005b):[7]

- Shafts 302-306. NNSA would retrieve the steel boxes from each shaft using cranes or other available means and would place them in fabricated shielded containers. The containers would then be stored at Area G for future processing, repackaging, and characterization using currently available facilities. However, the Hazard Category and Performance Assessment would need to be upgraded to Hazard Category 2 and Performance Category 3 for the Decontamination and Volume Reduction System; Waste Characterization, Reduction, and Repackaging facility; and modular units.
- Shafts 235-243 and 246-253. Substantial and detailed historical information exists at LANL regarding the characterization and packaging of the transuranic waste contained in the canisters in these shafts. NNSA is in the process of preparing documentation that would meet acceptable knowledge requirements of the New Mexico Environment Department and complete the characterization process. Once the New Mexico Environment Department has approved a permit modification and determined that the documentation is sufficient for characterization of this remote-handled transuranic waste. This waste would be retrieved by readily-available means, placed into WIPP 72B casks, and sent to WIPP.

[7] *After characterization, some of this transuranic waste could actually be determined to be low-level radioactive waste, which LANL staff would dispose of in onsite facilities in Area G.*

- Shafts 200-232. Approximately 950 cubic feet (27 cubic meters) of high-activity remote-handled transuranic waste in these shafts would be retrieved by the new, temporary remote-handled transuranic waste retrieval facility presented in Section H.3.2.2.1. The retrieved waste is assumed to be processed and prepackaged at the Decontamination and Volume Reduction System, Area G.

H.3.2.2.4 Low-level Radioactive Waste Processing Facilities

To facilitate closure of Area G and MDA G, low-level radioactive waste processing facilities would need to undergo DD&D. DD&D of these buildings would be completed by 2011. These facilities include (LANL 2005b):

- An access control and monitoring building (Building 54-0295).

- A characterization and verification building (Building 54-0002).

- A compactor building (Building 54-0281).

NNSA would replace these buildings with similar buildings in Zone 4 to support continued low-level radioactive waste disposal operations. It is assumed that the size and functions of these structures and processes would be duplicated in the new structures and processes in an expanded area of Zone 4.

Zone 4 is approximately 30 acres (12 hectares) located between, and adjacent to, the current operational areas in Area G and Area L. Access to Zone 4 and Area G is controlled by the gate at the western end of the waste management area. Mesita del Buey Road runs through Zone 4. The footprint of Zone 4 would need to expand westward into the current administrative area to accommodate the proposed low-level radioactive waste processing activities. The area south of Mesita del Buey Road would be the likely location of the processing activities. NNSA would also relocate the access gate, add a new access control structure, and remove or relocate several office trailers and storage sheds (LANL 2006).

Access Control and Monitoring Building

The access control and monitoring building would provide a physical control point for access to Zone 4 and of Area G and a support area for radiological program needs. The building would consist of the following characteristics (LANL 2006):

- A heating, ventilation and air conditioning system.

- An observation area with a large window to document entrance to and exit from Zone 4 and Area G.

- An administration area to support radiological control technicians and equipment.

- Separate entrances and exits for resident workers and non-resident workers (that is, workers that are delivering waste packages).

- Restrooms and locker areas for donning and removing personal protective equipment and personnel radiological monitoring.
- A break area.
- Remote gate and portal and turnstile control.

The proposed access control and monitoring building would be approximately 1,200 to 1,500 square feet (110 to 140 square meters) in size and located near the entrance to Zone 4 and Area G. The building could be either a steel manufactured building or a portable or modular building. LANL would limit the radiological inventory for the building to check and calibration sources used for instrument maintenance and operational needs related to survey and smear sample analysis (LANL 2005b). The building would be operational by 2009.

Characterization and Verification Building

The characterization and verification building would house the assay equipment associated with identifying and verifying radiological characteristics of waste materials. Survey methods would consist of non-intrusive methods such as gamma spectroscopy, neutron counting, and handheld instrument techniques. The building would consist of the following (LANL 2006):

- Central heating, ventilation, air conditioning, and dust control systems with a negative overpressure ventilation system.
- Processing areas for the characterization and verification equipment.
- A staging area for up to 15 55-gallon (210-liter) drums.
- Overhead rollup (coil) doors with ceiling clearance of at least 16 feet (5 meters) to provide for fork lift and lift truck access.
- A design floor load of 1,100 pounds per square foot (5,400 kilograms per square meter) to accommodate the concentrated floor loads of assay equipment that use lead shielding.
- Floors finished as smooth concrete with epoxy sealant for contamination control.
- Three-phase 480-volt power with a 200-amp panel with single-phase requirements being addressed with a step-down transformer, as appropriate.
- Building partitioning to address personnel monitoring and badge control, as well as a main restroom facility.

The proposed characterization and verification building would consist of a 2,500 to 3,000 square foot (230 to 300 square meter), single-story building. LANL staff would locate this facility in Zone 4 on the south side of Mesita del Buey Road. The building is anticipated to be designed to Hazard Category 3, Performance Category 2 standards (LANL 2006). The building would be operational by 2010 (LANL 2005b).

Compactor Building

The compactor building would serve as a low-level radioactive waste volume reduction facility that would house a new hydraulic compactor with associated glove box train and a drum crusher. The compactor building would have the following characteristics (LANL 2006):

- Sufficient space to operate both pieces of equipment. The compactor footprint is assumed to be 8 feet by 12 feet (2.4 meters by 3.7 meters), with access from at least two sides. The glove box dimensions would be 17 feet (5.2 meters) in length, 7 feet (2.1 meters) wide and 12 feet (3.7 meters) high with conveyor dimensions of 24 feet (7.3 meters) long, 8 feet (2.4 meters) wide and 20 feet (6.1 meters) high. The existing drum crusher footprint would be about 4 square feet (0.4 square meters) with access from at least one side.
- A waste package staging area of 300 to 500 square feet (28 to 46 square meters).
- A storage area of 300 square feet (28 square meters) for equipment, parts, and supplies.
- A ceiling clearance of about 28 feet (9 meters) for compactor maintenance access (a ceiling clearance for the drum crusher would be less than 16 feet, or 5 meters).
- Rollup (coil) doors to accommodate fork lift and lift truck access.
- A design floor load of 1,100 pounds per square foot (5,400 kilograms per square meter) to accommodate volume reduction equipment.
- Floors finished as smooth concrete with epoxy sealant for contamination control.
- Three-phase 480-volt power with a 200-amp panel with single-phase requirements being addressed with a step-down transformer, as appropriate.
- High-efficiency particulate air-filtered exhaust system for local contamination control.
- Centralized uninterruptible power supply backup for continuous air monitors and personal computers.
- Centralized vacuum system for air samplers.
- Negative overpressure air confinement (pending further safety analyses).

The compactor building would consist of a 3,000 to 5,000 square foot (280 to 460 square meter), single-story building near the administration building and characterization and verification building within the nuclear facility fenceline. The compactor building is anticipated to be designed to Hazard Category 3, Performance Category 2 standards (LANL 2006). The compactor would be operational by 2011 (LANL 2005b).

In addition to the DD&D of the current low-level radioactive waste processing facilities in Area G, all other above-ground structures in Area G would undergo DD&D prior to the completion of closure activities.

H.3.2.2.5 Mixed Low-level Radioactive Waste and Hazardous and Chemical Waste Storage

The structures and container storage units to be removed for closure activities would depend on the results of ongoing investigations, the design of the final cover, and other regulatory and programmatic decisions. For the purpose of the analyses related to this option, NNSA assumes that a single closure cover would be used. The storage capacities of the container storage units in Area L are shown in **Table H–15**.

Table H–15 Area L Container Storage Units and Associated Storage Volumes

Facility Identification Number	*Container Storage Unit*	*Volume (cubic feet)*	*Drum Equivalent*
54-31	Waste storage shed	177	24
54-32	Hazardous waste storage with canopy	2,295	312
54-35 [a]	Waste storage pad	2,119	288
54-36 [a]	Perma-Con® waste storage pad	1,766	240
54-39	PCB waste storage facility	5,474	744
54-58 [a]	Waste storage pad	2,119	288
54-68	Waste/lab pack storage unit	237	32
54-69	Waste/lab pack storage unit	237	32
54-70	Waste/lab pack storage unit	237	32
54-215 [a]	Mixed low-level radioactive waste storage dome	34,926	4,752
54-216 [a]	Gas cylinder storage dome	4,944	672
	Total	54,526	7,416

PCB = polychlorinated biphenyls.
[a] Container storage units that would be removed under Option 1. All container storage units would be removed in Option 2.
Note: To convert cubic feet to cubic meters, multiply by 0.028317.
Source: LANL 2005b.

Using a single closure cover, NNSA would undertake the following actions (LANL 2005b):

- Remove container storage units 54-35, 54-58, 54-215 and 54-216 (and part of the Area L container storage unit, which is the paved area inside the Area L fenceline).
- Re-site container storage units 54-68 and 54-69.
- Close or re-locate container storage unit 54-36 (a Perma-con® unit used for sampling, repackaging, or consolidation).
- Decommission and remove Canopy 54-62.
- Re-site modular structures 54-50 and 54-1058.
- Modify the Area L fenceline.
- Remove office structures 54-37, 54-51, 54-60, 54-83, and 54-84.

Structures to be relocated to another location in Area L that is paved would be small enough to be moved with a fork lift or small crane. The mixed low-level radioactive waste storage dome would undergo DD&D. Other structures would undergo demolition using conventional means without the need for decontamination.

LANL would continue to consolidate mixed low-level radioactive waste storage operations at Area L using existing storage facilities that would not be impacted by closure activities. Only enough storage space for 530 to 5,830 cubic feet (15 to 165 cubic meters) of mixed low-level radioactive waste is required, or approximately 72 to 793 drum-equivalents, which is as high as 17 percent of the current storage capacity in the mixed low-level radioactive waste dome (LANL 2005b). Future storage needs would therefore be approximately 2,600 square feet (242 square meters) (assuming the mixed low-level radioactive waste dome is 15,181 square feet [1,410 square meters] and the storage space required is proportional to the square footage).

LANL staff would manage hazardous and chemical wastes through the Consolidated Remote Waste Storage Site project, which has established locations across the LANL site as hazardous waste collection and consolidation sites. Hazardous wastes can be stored up to 90 days at these sites before direct shipment off-site for treatment and disposal. These sites currently handle the majority of hazardous and chemical wastes. For periods when waste generation exceeds the capacity of the smaller waste collection points, NNSA uses Dome 282 in TA-54, Area J, near the Radioassay and Nondestructive Testing facility for overflow from other locations. Container storage unit 54-32, which can store up to 312 drums, would remain in Area L and would continue to be used for the temporary storage of newly-generated hazardous and chemical wastes.

H.3.2.3 Option 2: Interim Actions Necessary for Meeting Consent Order and Other Options

Option 2 primarily considers variations of Option 1 if legacy and newly- generated stored wastes cannot be removed from storage, processed, and shipped to disposal facilities on an accelerated schedule that would allow completion of closure activities in Area L and MDA L, and Area G and MDA G, as required by the Consent Order.

Option 2a: It is possible that schedule requirements, technical challenges, regulatory requirements, or other factors may prevent complete removal of transuranic waste from Area G and MDA G and shipment to WIPP in an accelerated timeframe that allows closure activities to begin. In this option, NNSA would move the remaining transuranic waste in Area G to another location outside of Area G to be stored until processed and shipped. NNSA would construct two additional storage structures at the Transuranic Waste Consolidation Facility or another location for storage of legacy transuranic wastes. This option considers that transuranic waste currently stored in Pit 9 and shafts would require storage somewhere at the LANL site other than Area G. The transuranic waste in Pit 9 and the shafts would require approximately 7,986 drum equivalents of storage space. This would require shipments (and accompanying road closures) to be made. The number of shipments would be reduced if the storage location is combined with the Transuranic Waste Consolidation Facility, since the Transuranic Waste Consolidation Facility is assumed to ultimately process this waste under Option 2.

The two transuranic waste storage buildings would be similar in size to Dome 375, but with a different overhead confinement system. Each storage building would consist of approximately 30,000 square feet (2,787 square meters) that could hold up to a total of 8,000 drum equivalents (using Dome 375 as a baseline). The volume of these wastes would be approximately 7,190 drum equivalents (NNSA 2003). The Decontamination and Volume Reduction System would be used to perform size reduction of the crates and oversized boxes prior to storage in the two new storage buildings.

Option 2b: LANL staff would leave the high-activity remote-handled transuranic waste in Shafts 200-232 in place in the shafts in Area G and MDA G (the more easily-retrieved transuranic waste is assumed to be removed from underground storage areas). LANL staff would retrieve and store the other, more retrievable remote-handled transuranic waste in the two new storage buildings, as described in Option 2a. LANL staff would need to perform additional performance assessments for closure activities to upgrade closure activities to address this high-activity remote-handled transuranic waste, as described in Appendix I. Leaving the higher activity remote-handled transuranic waste in place is contingent on whether the New Mexico Environment Department would require all radioactive wastes to be removed from MDA G. The New Mexico Environment Department is expected to make this decision by December 18, 2007 (NMED 2005a).

Option 2c: Mixed low-level radioactive waste and hazardous and chemical waste would be stored at the Transuranic Waste Consolidation Facility and the use of Area L would cease for these operations. LANL would continue to manage hazardous and chemical wastes through other sites in the Consolidated Remote Waste Storage Site project and would obtain a RCRA permit for the Transuranic Waste Consolidation Facility for storing hazardous wastes for periods greater than 90 days.

H.3.2.4 Options Considered but Eliminated

NNSA considered but eliminated several options associated with the management of transuranic wastes. The following presents these options and the reasons they were eliminated from further consideration.

Locate the Transuranic Waste Consolidation Facility at a Major Generator Facility in an Existing Facility at TA-55

This option addresses newly generated transuranic waste that would be expected after waste management activities cease in TA-54, Area G. In this option, non-destructive analysis and real-time radiography activities would be conducted at TA-55 in existing facilities. The storage, loading, decontamination, and size reduction functions would be housed in an existing facility, such as the former Radioactive Materials Research, Operations and Demonstration Facility, which would require a RCRA permit (Vance 2005).

This option was eliminated from further consideration because (Vance 2005):

- The limited space in the Radioactive Materials Research, Operations and Demonstration Facility and perhaps less than optimum configuration of its floor space may not allow accommodation of all of the intended transuranic waste management functions.

- Road closures would be required.

Use a Vendor for Transuranic Waste Management Services

In this option, NNSA (or the DOE Carlsbad Field Office) would contract with a commercial vendor for characterization, certification, packaging and shipping responsibilities. The vendor would provide a certified program and NNSA would provide the equipment and facilities for headspace gas sampling and analysis, non-destructive analysis, real-time radiography, visual examination, repackaging, and TRUPACT II loading and shipping. The activities would be located at TA-54 West near the Radioassay and Nondestructive Testing facility. NNSA would also be responsible for transuranic waste storage and movement. Audits would be performed during the drum processing campaigns. Use of a vendor could be more cost-effective if transuranic waste processing could occur on a campaign-basis as opposed to continuously (Vance 2005).

This option was eliminated because:

- Road closures would still be required on Pajarito Road from TA-55 to TA-54.
- A storage and decontamination and size reduction facility would still need to be constructed at TA-54 West.
- If transuranic waste needs to be processed continuously throughout the year, then the cost-effectiveness of this option becomes questionable since the cost advantage is achieved through processing in campaigns (or batches).
- NNSA personnel, equipment, and facilities are still required to support this option, therefore requiring significant indirect costs.
- The facility would need RCRA permitting.

Locate the Transuranic Waste Consolidation Facility in TA-54 West

In this option, a new structure would be built at TA-54 West that would contain the decontamination and size reduction functions. Nondestructive analysis and real-time radiography activities would be conducted at TA-55 in existing facilities. Loading and shipping activities would remain at the Radioassay and Nondestructive Testing facility, which is also located in TA-54 West. A modular unit may be required for any routine visual examination and repackaging activities (Vance 2005).

This option was eliminated because road closures between TA-55 and TA-54 West would still be required.

H.3.3 Affected Environment and Environmental Consequences

Detailed information about the LANL environment is presented in Chapter 4. Specific information relevant to the consequences of the proposed waste management facilities transition is addressed under each of the affected resource areas.

An initial assessment of the potential impacts of the proposed project identified resource areas for which there would be no or only negligible environmental impacts. Consequently, for the following resource areas, a determination was made that no further analysis was necessary: environmental justice and socioeconomics.

H.3.3.1 No Action Option

The No Action Option would result in continued operation as discussed in Section H.3.2.1. Processing of transuranic waste stored aboveground would continue as currently performed. All radioactive wastes stored belowground would remain. The current low-level radioactive waste processing facilities would remain in use. Hazardous and mixed radioactive waste storage operations in Area L would continue. The impacts related to the No Action Option are described in Chapter 5. If no action is taken, then NNSA would not be able to complete corrective actions and closure activities in Area L and MDA L, and Area G and MDA G, and would therefore not be in compliance with the Consent Order. Impacts to all resource areas would remain as currently observed with increased environmental contamination possible.

H.3.3.2 Option 1: Accelerated Actions for Meeting the Consent Order

Land Resources

Land Use

TA-63 is 50 acres (20 hectares) in size and is located along Pajarito Road approximately 1.5 miles (2.4 kilometers) southeast of TA-3. Current land used designations include Physical and Technical Support and Reserve; however, future land use would see most of the site dedicated to Waste Management with the exception of two small areas along the northern and eastern border which would remain Reserve (LANL 2003a). TA-63 is located within the Pajarito Corridor West Planning Area as set forth in the *Comprehensive Site Plan* for 2001. According to the Plan much of the site is designated as Secondary Development with remaining areas being Potential Infill. The proposed site of the Transuranic Waste Consolidation Facility is within an area designated as Potential Infill (LANL 2001a).

TA-50 is 62 acres (25 hectares) in size. It is 1.3 miles (2.1 kilometers) southeast of TA-3 along Pajarito Road. Current land use designations include Waste Management and Reserve. Only that portion of the TA located north of Pajarito Road contains buildings. Future land use categories are projected to be similar, except that the Waste Management land use area could be enlarged to include the entire northern part of the TA (LANL 2003a). TA-50 is within the Pajarito Corridor West Planning Area as set forth in the *Comprehensive Site Plan* for 2001. The potential area within which the Transuranic Waste Consolidation Facility could be located is designated as Potential Infill (LANL 2001a).

TA-54 is one of the larger TAs at Los Alamos, measuring 943 acres (382 hectares) in size. The 3-mile (4.8 kilometer) northern border of the site forms the boundary between LANL and the Pueblo of San Ildefonso. The town of White Rock is located to the east of the TA. Land use within TA-54 is categorized as Experimental Science, Waste Management, and Reserve, which is where the additional transuranic waste processing equipment and facilities (including the remote-handled transuranic waste retrieval facility) would be located. Future land use is likely to remain similar, except that the area devoted to waste management is projected to expand such that it forms a continuous band along the TA's southern boundary (LANL 2003a). According to the *Comprehensive Site Plan* for 2001, TA-54 is within the Pajarito Corridor East Development Area. The area within which Area G and Area L fall is categorized as Potential Infill and Primary Development (LANL 2001a).

Construction, DD&D, and Operations Impacts—All actions within TA-54, including construction of a remote-handled transuranic waste retrieval facility; removal of the white domes at MDA G; DD&D of most above-ground facilities in TA-54; construction of a TRUPACT II loading facility; relocation of transuranic waste processing equipment from outdoor areas to a transuranic waste storage dome; expansion of Zone 4 and construction of a low-level radioactive waste administration building, characterization and verification building, and compactor building; reconfiguration of storage facilities in Area L; and use of Dome 282 for hazardous waste storage would take place within previously disturbed parts of TA-54. These areas are currently designated Waste Management, a designation that would not change in the future; thus, there would be no impact on land use within TA-54 under this option.

The Transuranic Waste Consolidation Facility would be required under this option. The specific location of this facility has not been selected but it could be built as a new structure occupying 2 to 4 acres (0.8 to 1.6 hectares) at TA-50 adjacent to the intersection of Pajarito Road and Pecos Road), or at a site near TA-63 at the intersection of Pajarito Road and Puye Road. Both sites are relatively close to TA-55, where the majority of the transuranic waste is generated. There would be no impact on land use if the new building were built in either TA-50 or TA-63 since future land use within both proposed construction sites has been designated Waste Management. Both areas are also designated as Potential Infill in the *Comprehensive Site Plan* for 2001 (LANL 2001a).

Visual Environment

Although TA-63 is included within a series of highly developed TAs along the upper portion of Pajarito Road, little development has taken place within its boundaries. Those portions of the TA located adjacent to the road are generally open fields. Areas to the north of Puye Road are wooded and include a portion of Mortandad Canyon. Views of the area from Pajarito Road are available only to site personnel due to the closure of Pajarito Road to the public. Distant views from higher elevations to the west would be of an open area with the intersection of Pajarito and Puye Roads helping to define the location of the site. The area within which the Transuranic Waste Consolidation Facility could be constructed presents an open appearance with a few scattered trees.

TA-50 is located along Pajarito Road. TA-50 is one of a series of TAs along the upper 2.7 miles (4.3 kilometers) of the road within which development has taken place. TA-50 itself includes portions of the mesa and Mortandad Canyon. Development has occurred on that part of the site that is north of Pajarito Road with most of area south of the road remaining forested. Although near views of TA-50 are industrial in nature, they are available only to site personnel due to the closure of Pajarito Road to the public. From a distance, the TA appears as part of the highly developed corridor along the upper portion of Pajarito Road. That portion of the TA within which the Transuranic Waste Consolidation Facility could be constructed is presently an open field.

TA-54 is at the eastern end of Pajarito Road and borders both the Pueblo of San Ildefonso and White Rock. While buildings and structures of the TA are visible from higher elevations to the west, near views of many elements of the TA are limited since Pajarito Road is closed to the public. However, the dominant feature of the site is the white-colored domes of MDA G in the eastern end of the TA. These domes contrast with the natural landscape and can be seen many miles away from areas in the Nambe-Española area and from areas in western and southern Santa Fe (LANL 2004a). They are also visible from the lands of the Pueblo of San Ildefonso.

Construction, DD&D, and Operations Impacts—Although a number of new buildings, including temporary and permanent structures, would be constructed within TA-54 under this option (including the remote-handled transuranic waste retrieval facility, low-level radioactive waste processing buildings, and relocation and addition of new equipment and a TRUPACT II loading area), all would be built within previously disturbed areas. Thus, construction would have minimal impact on visual resources under this option. However, removal of the white-colored domes at MDA G would have a beneficial impact on both near and distant views.

The Transuranic Waste Consolidation Facility could be located at TA-50 adjacent to the intersection of Pajarito Road and Pecos Road, or at a site near TA-63 at the intersection of Pajarito Road and Puye Road. Construction of the new facility within undeveloped areas of either TA-50 or TA-63 would alter the generally open view. Construction would cause temporary impacts on visual resources due to the presence of equipment and dust during construction. However, since Pajarito Road is not open to the public and dust generation would be controlled using best management practices, offsite impacts would be negligible. Once complete, near views of the Transuranic Waste Consolidation Facility would only be available to employees since Pajarito Road is not open to the public. Further, there would be little impact to the viewshed from higher elevations to the west due to the highly developed nature of LANL along Pajarito Road.

Proposed changes in Area L to remove and re-locate some mixed low-level radioactive waste and hazardous and chemical storage facilities would be conducted within previously disturbed areas to facilities not easily visible unless someone is traveling past Area L along Pajarito Road. Thus, any changes would have minimal impact on visual resources.

Geology and Soils

Geology, soils, and geological resources at LANL are addressed in Section 4.2 of this SWEIS. TA-50 and TA-63 are located along the eastern edge of the Pajarito Fault system, with TA-54 located further east. Specifically, the closest segment of the 9-mile (14-kilometer) long Rendija Canyon fault is located approximately 0.4 miles (0.6 kilometers) west of TA-50 and TA-63 and more than 3.7 miles (6 kilometers) northwest of TA-54. This fault exhibits as much as 130 feet (40 meters) of post-Bandelier Tuff displacement. Other small faults have been mapped in the area; they are generally subsidiary to the main fault and have limited displacement. Small fault traces have been mapped throughout central LANL; their potential rupture hazard is very small (LANL 1998). As noted in Section 4.2, the seismic risk at LANL is considered very small.

Soils associated with the affected technical areas are generally thin and directly overlie the Bandelier Tuff. As discussed in Section 4.2.3 of this SWEIS, some soils have been affected by facility releases, but the majority of sites are well below contaminant screening levels.

Construction, DD&D, and Operations Impacts—Option 1 would include closure of MDA G and MDA L per the Consent Order (NMED 2005a). This action should reduce the potential for soil erosion that could occur through No Action based on the use of standard construction practices at LANL. Similarly, the use of standard practices in facility DD&D, as well as facility construction, should result in negligible impact to soils under Option 1.

Direct impacts on geology and soils under Option 1 would generally be proportional to the total area of land disturbed and earthwork necessitated for new construction (see Section 5.2), particularly the new waste management facilities in TA-54 and the new Transuranic Waste Consolidation Facility to be constructed near either TA-50 or TA-63, and demolition and closure of appropriate container storage units in Area L and fabric domes in Area G. However, most of the work would be performed in areas where these resources already have been disturbed by existing or past activities.

Approximately 80,000 cubic yards (61,000 cubic meters) of earthwork would be required to implement Option 1. This estimate reflects the construction of the new low-level radioactive waste processing facilities to be constructed in Zone 4, the construction of the Transuranic Waste Consolidation Facility, and the remote-handled transuranic waste retrieval facility, but it does not reflect the construction of a new TRUPACT II loading area since this would be placed inside an existing dome. Aside from earthmoving, excavation depths would generally be limited to 10 feet (3 meters) or less. In all instances, adherence to standard best management practices for soil erosion and sediment control, including watering during construction, would serve to minimize soil erosion and loss. After construction, disturbed areas that have not been paved would be stabilized and revegetated and would not be subject to long term soil erosion.

Potential release sites and potential release site-affected areas could be impacted by new facility construction. Prior to commencing any ground disturbance, potentially affected contaminated areas would be surveyed to determine the extent and nature of any contamination and required remediation in accordance with procedures established under the environmental restoration project. At areas where facilities would be removed or the facility footprint reduced, a decrease in the potential for contaminant releases would occur. This would include the consolidation of transuranic waste processing equipment into a dome such as Dome 375 from outdoor areas.

Geologic resource consumption would be negligible to small under Option 1 and would not be expected to deplete local sources or stockpiles of required materials. Approximately 4,900 cubic yards (3,746 cubic meters) of concrete including associated aggregate (sand and gravel) and Portland cement would be needed during construction. Component aggregate resources are readily available from onsite borrow areas and otherwise abundant in Los Alamos County, with the required concrete expected to be procured via an off-site supplier.

No mines, pits, or quarries are being operated in TA-50, TA-63 and TA-54 so neither option will have any impact on geological resources (Stephens and Associates 2005). All proposed new facilities would be designed according to their seismic design safety basis.

It is anticipated that the new remote-handled transuranic waste retrieval facility and Transuranic Waste Consolidation Facility would be Performance Category 3 facilities while the characterization and verification and compactor buildings would be Performance Category 2 facilities. Facility construction activities would adhere to standard best management practices for soil erosion and sediment control to minimize soil erosion and loss. This would minimize the potential for release of contaminants within the soil matrix. After construction, disturbed areas that have not been paved would be stabilized or revegetated and would not be subject to long term soil erosion.

Following the completion of Option 1, operations would not result in additional impacts on geologic and soil resources at LANL. As discussed above, new facilities would be evaluated, designed, and constructed in accordance with DOE Order 420.1A (DOE 2002b) and other governing DOE and LANL construction standards and sited to minimize the risk from geologic hazards, including earthquakes.

Water Resources

Hydrology and water resources are addressed in detail in Chapter 4, Section 4.3, and in Appendix E (Groundwater in the Vicinity of LANL) of this SWEIS. Appendix F of this SWEIS includes sample information pertaining to water resources. Appendix I includes a discussion of water resources in TA-54, Area L and Area G.

TA-54 is one of the industrial sites at LANL covered by the Multi-Sector General Permit that has an individual stormwater pollution prevention plan. As a waste treatment, storage, or disposal facility, the stormwater pollution prevention plan includes stormwater controls, spill and leak procedures, maintenance procedures, and specific stormwater monitoring requirements (EPA 2000). Stormwater controls are inspected regularly as part of regular site inspections at the facility.

TA-50, located at the head of Ten Site Canyon, and TA-63, located on a finger mesa between Mortandad Canyon and Ten Site Canyon, is underlain by the Bandelier Tuff. The vadose zone, from the surface to the water table, at these locations is approximately 1,200 feet (366 meters) thick. Groundwater in the vadose zone cannot be produced in quantities that might be used for human or animal consumption. Moisture content of rock in the vadose zone is low and extraction in useful amounts is impractical using existing technology.

Construction and DD&D Impacts—Little or no effect on surface water resources is expected during removal or replacement of facilities required to close Area L and MDA L, and Area G and MDA G. Construction and eventual DD&D of the remote-handled transuranic waste retrieval facility would occur under the protection of a construction stormwater pollution prevention plan. Construction of the Transuranic Waste Consolidation Facility would also require a construction stormwater pollution prevention plan. Construction of new low-level radioactive waste processing facilities in Zone 4 and DD&D of these facilities at MDA G would include construction stormwater pollution prevention plan controls. Another construction stormwater pollution prevention plan would be required for any structure removal and final cover installation at Area L and MDA L. All of the stormwater controls introduced for the construction and demolition projects would augment the controls already in place. Construction of a

TRUPACT II loading facility and consolidating equipment in one of the fabric domes would not require any mitigative measures because they would be located inside an existing facility.

Infiltration rates at the surface are thought to be low, on the order of a few millimeters per year or less (Kwicklis et al. 2005). Construction and DD&D of the remote-handled transuranic waste retrieval facility, the Transuranic Waste Consolidation Facility, and the current low-level radioactive waste buildings would likely result in surface disturbances which could result in increased infiltration rates (by up to about two orders of magnitude) as a result of rainfall events, snowmelt, or ponded water. It is difficult to estimate whether increased infiltration would change the rate of migration of any contaminants that may be situated under the disturbed areas, although near-surface contamination could be mobilized (or if currently mobile, transport could be accelerated over a small distance during periods of increased infiltration). Removal of waste, to the extent anticipated, would decrease the quantity of contaminants available for release to the environment, although increased infiltration could affect deeper contamination within the soil and tuff that is beyond the reach of the excavation. In any case, current rates of transport in the vadose zone overall are unlikely to change through 2011, nor will groundwater resources be affected over this period. Consolidation of transuranic waste processes from outdoor areas to inside a dome would have minimal positive impacts.

Operations Impacts—Retrieval and processing of wastes should have little or no effect on surface water resources. Although remote-handled transuranic wastes that would be retrieved by the remote-handled transuranic waste retrieval facility should contain no liquids, processing areas would have shielded sumps to collect any liquids generated during processing. Similarly, although newly-generated contact-handled transuranic wastes should contain no free liquids, the floor of the Transuranic Waste Consolidation Facility would direct any unexpected liquids to a sump for recovery, treatment, and proper disposal. Regardless of where the Transuranic Waste Consolidation Facility is located, that site would need to be included in the Multi-Sector General Permit for industrial activities and would require an industrial stormwater pollution prevention plan.

Retrieval and processing of wastes, similar to construction activities, would entail disturbance of the surface and potentially increase infiltration to groundwater. Further, the handling of waste would run the risk of spill or loss; however, amounts would likely be small due to the small amount of liquid currently present and proper waste handling techniques.

Appropriately designed and constructed closure covers to be used for MDAs G and L should reduce the effects of stormwater infiltration that could mobilize contaminants and transport them to the groundwater.

Air Quality and Noise

Air Quality

Nonradiological air pollutant emission sources at the Solid Radioactive and Chemical Waste Management Key Facility include the use of various toxic chemicals. Emissions of toxic pollutants from the Solid Radioactive and Chemical Waste Management Key Facility are shown in **Table H–16** and are based on chemical usage. These emissions vary by year with the amounts of chemical being used but provide a basis for establishing baseline conditions.

Table H–16 Nonradiological Air Pollutant Emissions at Solid Radioactive and Chemical Waste Management Key Facility – 2004

Pollutant	*Tons per Year*
Ethanol	0.00122
Hydrogen chloride	0.36171
Nitric acid	0.01354
Potassium hydroxide	0.00303
Propane	0.00
Sulfuric Acid	0.23839

Note: To convert tons to kilograms, multiply by 907.18.
Source: LANL 2005d.

A comparison of calculated maximum emission rate derived from health-based standards to the potential emission rate was made. A screening level emission value was developed for each chemical. A screening level emission value is a theoretical maximum emission rate that, if emitted at that TA over a short-term (8-hour) or long-term (1-year) period, would not exceed a health-based guideline value. This screening level emission value was compared to the emission rate that would result if all the chemicals purchased for use in the facilities at a TA over the course of one year were available to become airborne. At TA-54, chemicals would be emitted at levels below the screening levels identified.

Radiological air emissions, which contribute to the total radiological dose to a person, currently come from area sources and the Decontamination and Volume Reduction System at TA-54. Area source emissions include a) airborne soils from disturbing contaminated soils at TA-54, b) buried tritium-contaminated materials where tritium migrates to the surface and becomes airborne, and c) non-packaged waste as it is placed into the pits at Area G before it is covered. Appendix C of this SWEIS provides a breakdown of potential radiological air emissions from TA-54.

Construction and DD&D Impacts—Construction of new waste processing facilities under Option 1 (that is, the remote-handled transuranic waste retrieval facility, the Transuranic Waste Consolidation Facility, the TRUPACT II loading facility, and the low-level radioactive waste processing buildings) would result in temporary increases in air quality impacts from construction equipment, trucks, and employee vehicles. Modeling of criteria pollutant concentrations for construction of other facilities in the general areas at TA-50, TA-63 and TA-54 has indicated that the maximum ground-level concentrations offsite would be below the ambient air quality standards and it is expected that the air quality impacts on the public would be minor. Most of the equipment that would be used for DD&D would be construction equipment. Vehicle emissions during DD&D would be similar to those during construction. Additional dust from the demolition of buildings and materials would also temporarily contribute to localized air quality impacts; however, these activities would not be expected to exceed ambient air quality standards.

For radiological emissions, during initial DD&D there would be emissions during the removal of equipment and decontamination of structural surfaces. While the building shell is intact, emissions would result from building or temporary ventilation systems used for dust and contamination control. These systems would use high-efficiency particulate air filtration prior to exhausting air from interior contaminated spaces to areas outside the building. Ventilation and other controls would be used to minimize worker inhalation and exposure to radioactivity and avoid recontamination of previously decontaminated areas. The result of the initial activities would be structural surfaces either decontaminated to unconditional-release levels or with selected contaminated surfaces stabilized to permit segregation of radioactively-contaminated and -uncontaminated debris after demolition.

The potential exists for contaminated soils, building debris, and possibly other media to be disturbed during building demolition. Release of radioactivity would be minimized by proper decontamination of buildings prior to demolition – if facilities are decontaminated to unconditional release levels as prescribed by the MARSSIM protocol (MARSSIM 2000), emissions would be similar to those from uncontaminated buildings. If residual levels of contamination remain after decontamination activities are complete, then small amounts of radioactivity would be emitted during demolition. The radionuclide concentrations resulting from demolition of contaminated facilities may be predicted based on the pre-demolition characterization of the building, and would be addressed in regulatory documents approved at that time. Such emissions are typically of short duration, and would be minimized using dust suppression techniques and monitored along with the fugitive dust.

Radiological air emissions from the Decontamination and Volume Reduction System would remain as currently observed until the facility undergoes DD&D in preparation for closure of Area G and MDA G. Two new facilities, the remote-handled transuranic waste retrieval facility and the Transuranic Waste Consolidation Facility, would be assumed to emit radiological air emissions equivalent to the Decontamination and Volume Reduction System. **Table H–17** summarizes the annual air emissions to be expected from each of these three facilities.

Table H–17 Radiological Air Emissions from Each Waste Management Facility

Isotope	*Annual Air Emission Rate (curies per year)*
Americium-241	3.53×10^{-6}
Plutonium-238	1.76×10^{-5}
Plutonium-239	7.78×10^{-6}

Source: Appendix C of the *Consolidation EIS*.

The radiological air emissions for the Decontamination and Volume Reduction System would continue until approximately 2015. The radiological air emissions for the remote-handled transuranic waste retrieval facility, to be located in TA-54 Area G, would occur from 2011 to 2015. The radiological air emissions for the Transuranic Waste Consolidation Facility, which may be located in TA-50 or TA-63, would occur starting in 2012 and continue for the next 30 to 35 years.

Radiological air emissions from area sources in TA-54 are expected to continue at current rates until 2016, after which time there should be some decrease because of closure of MDA G. The primary radionuclide in area air emissions is tritium, with approximately 60.9 curies per year projected to be released (see Appendix C).

Operations Impacts—During operations, toxic air pollutants would be generated from the use of various chemicals. Toxic pollutants released would be expected to be similar to current uses as shown in Table H–16 for the facilities at TA-54 and other locations associated with waste management operations. These emissions would vary by year with the activities performed. The emissions would be expected to be small and below the screening level emission values and it is expected that the air quality impacts on the public would be minor.

Noise

Operations noise sources from the Solid Radioactive and Chemical Waste Management Key Facility include heating, ventilation, and cooling equipment and vehicles. There are minimal noise impacts on the public from current waste management activities.

Construction and DD&D Impacts—Construction of new waste processing facilities under Option 1 would result in some temporary increase in noise levels near the area from construction equipment and activities. Some disturbance of wildlife near to the area may occur as a result of operation of construction equipment. There would be no change in noise impacts on the public outside of LANL as a result of construction activities, except for a small increase in traffic noise levels from construction employees' vehicles and materials shipment. Noise sources associated with construction of these facilities are not expected to include loud impulsive sources such as from blasting. DD&D activities may include blasting, but these events, if necessary, would only be for larger structures and the number of events would be small.

Operations Impacts—Noise impacts from operation of the waste processing facilities are expected to be similar to those from existing waste processing facilities at TA-50 and TA-54. Although there would be small changes in traffic and equipment noise (such as new heating and cooling systems) near the area, there would be little change in noise impacts on wildlife and no change in noise impacts on the public outside of LANL as a result of operating these new facilities.

Ecological Resources

TA-63 is within the Ponderosa Pine (*Pinus ponderosa* P. & C. Lawson) Forest vegetation zone. Those areas of the site along Pajarito Road are generally open field, with little development, while portions of the site located within Mortandad Canyon are forested. Wildlife use of the site would be typical of ponderosa pine forests, although some species could avoid open areas near roadways (DOE 1999a). During the Cerro Grande Fire the entire area was burned at a low, unburned severity level (LANL 2000a). There are no wetlands present within TA-63 (Army Corps of Engineers 2005).

TA-63 is within both the core and buffer zone of the Pajarito Canyon Mexican spotted owl (*Strix occidentalis lucida*) Area of Environmental Interest and the buffer zone of the Sandia-Mortandad Canyon Area of Environmental Interest. That portion of the TA within which the Transuranic Waste Consolidation Facility could be located is in the buffer zone of both Areas of

Environmental Interest. TA-63 does not include portions of the Areas of Environmental Interest for the bald eagle (*Haliaeetus leucocephalus*) or southwestern willow flycatcher (*Empidonax traillii extimus*) (LANL 2000b).

TA-50 lies within the Ponderosa Pine Forest vegetation zone. While most of the area north of Pajarito Road has been developed, the area south of the road is in a more natural state. During the Cerro Grande Fire the entire TA was also burned at a low, unburned severity level (LANL 2000a). Wildlife present within undeveloped portions of the area would be expected to be typical of ponderosa pine forests (DOE 1999a). There are no wetlands or aquatic resources present within TA-50 (Army Corps of Engineers 2005).

TA-50 falls within both the core and buffer zone of the Pajarito Canyon Mexican spotted owl Area of Environmental Interest and the buffer zone of the Sandia-Mortandad Canyon Area of Environmental Interest. Those portions of the site within which the Transuranic Waste Consolidation Facility could be located are in the buffer zone of both Areas of Environmental Interests; however, potential sites north of Pajarito Road are within developed areas. TA-50 does not include portions of Areas of Environmental Interest for the bald eagle or southwestern willow flycatcher (LANL 2000b).

TA-54 is largely located within the Piñon (*Pinus edulis* Engelm.)-Juniper (*Juniperus monosperma* [Engelm.] Sarg.) Woodland vegetation zone; however, the western most portion of the area falls within ponderosa pine forest. Wildlife using the TA would include species typical of both vegetation zones. Although most of the area was untouched by the Cerro Grande Fire, the northwestern portion of the site was burned at a low, unburned to medium severity level. At a medium severity level, seed stocks can be adversely affected and erosion can increase due to the removal of vegetation and ground cover (LANL 2000a). Areas G and L are disturbed areas with minimal ground cover that are largely fenced; thus, wildlife use of these areas would be limited to small mammals, birds, and reptiles (Marsh 2001). There are no wetlands located within TA-54; however, a number of wetlands are located within Pajarito Canyon (TA-36) just to the south (see Section H.1.3.2) (Army Corps of Engineers 2005).

A portion of TA-54 falls within the core and buffer zones of the southwestern willow flycatcher Area of Environmental Interest; however, the Area of Environmental Interest is restricted to the canyon and does not include any part of the Areas G and L. Areas of Environmental Interest for the Mexican spotted owl and bald eagle do not encompass any part of TA-54 (LANL 2000b).

Construction, DD&D and Operational Impacts—Under Option 1, all actions within TA-54, including new construction expansion of Zone 4, DD&D activities, and removal of the white colored domes, would take place within developed areas. Thus, there would be little to no impact on ecological resources. Further, the TA does not fall within Areas of Environmental Interest for the Mexican spotted owl or bald eagle. While it does include a portion of the southwestern willow flycatcher Area of Environmental Interest along its southern boundary, best management practices should prevent stormwater actions associated with work in Areas G and L from impacting willow flycatcher habitat. If closure activities were to take place during the breeding season (May 15 through September 15), southwestern willow flycatchers could be disturbed and surveys would need to be undertaken to determine if flycatchers were present. If none were found, there would be no restrictions on project activities. However, if they were present, restrictions could be implemented to ensure that noise and lighting limits were met (LANL 2000b).

Construction of the Transuranic Waste Consolidation Facility within TA-50 would disturb 2 to 4 acres (0.8 to 1.6 hectares) of generally open field containing some ponderosa pine trees, while construction within TA-63 would involve disturbance to the same acreage of open field. During construction, ground disturbing activities could result in the loss of less mobile species and the displacement of other more mobile animals. Also during construction, noise and human presence could disturb animals living in adjacent areas. Such disturbance would be temporary and could be mitigated by keeping workers within the designated construction zone and properly maintaining equipment. Impacts to wetlands and aquatic resources would not be expected within either TA-50 or TA-63 since none are found in either TA. Operation of the Transuranic Waste Consolidation Facility would not impact ecological resources.

Portions of TA-50 and TA-63 fall within the Sandia-Mortandad Canyon and Pajarito Canyon Mexican spotted owl Areas of Environmental Interest. Both potential sites for the Transuranic Waste Consolidation Facility are located within the buffer zone of the Areas of Environmental Interest. While direct impacts would not be expected, construction has the potential to disturb the spotted owl due to excess noise or light. If construction were to take place during the breeding season (March 1 through August 31), owls could be disturbed and surveys would need to be undertaken to determine if they were present. If none were found there would be no restrictions on construction activities. However, if they were present restrictions could be implemented to ensure that noise and lighting limits were met. Areas of Environmental Interest for the bald eagle and southwestern willow flycatcher do not include any part of TA-50 or TA-63; thus, these species also would not be adversely affected by the new facility.

Human Health

This section summarizes the information on public and worker health affected by both nonradiological and radiological impacts that are currently observed in LANL operations. In particular, the focus is on those structures and processes in TA-50 and TA-54 since the majority of waste management facilities are located in these two areas. There are currently no major waste management operations in TA-63.

Nonradiological impacts include current occupational injury rates due to construction, operations, and DD&D, as well as toxic chemical and biological agent hazards. Radiological impacts are related to the amount of radiological dose that a member of the public and an on-site worker might receive due to radiological emissions and direct radiation in these technical areas. Section 4.6 generally describes off-site and on-site exposures due to LANL operations. This information cannot be assigned to specific areas within LANL, such as to TA-54.

Table H–18 summarizes the potential radiation dose to the facility-specific maximum exposed individual and population within 50 miles (80 kilometers) of waste management operations in TA-54. The facility-specific (TA-54) maximum exposed individual is assumed to be located approximately 394 yards (360 meters) northeast of TA-54. The primary isotopic contributor to the radiological dose to the maximum exposed individual shown in Table H–18 is tritium

(71 percent of the 0.052 millirem per year). These radiological doses were calculated using the computer model CAP88-PC, which is described in Appendix C.

Table H–18 Potential Radiation Dose from Current Technical Area 54 Operations

Source	*Dose to the Facility-Specific Maximum Exposed Individual (millirem per year)*	*Latent Cancer Fatality Risk*
TA-54 Area Sources	0.045	2.7×10^{-8}
Decontamination and Volume Reduction System	0.0073	4.4×10^{-9}
Total	0.052	3.1×10^{-8}
	Dose to Population within 50 Miles (person-rem per year)	
TA-54 Area Sources	0.025	1.5×10^{-5}
Decontamination and Volume Reduction System	0.012	7.3×10^{-6}
Total	0.037	2.2×10^{-5}

TA = technical area, rem = roentgen equivalent man.

The 6-year average (1999 to 2004) collective total effective dose equivalent for the LANL worker population was 162 person-rem (LANL 2003a, 2005d). In general, determining the collective total effective dose equivalent for each Key Facility or technical area is difficult to determine because this data is collected at the group level, and members of many groups or organizations receive doses at several locations. The fraction of a group's collective total effective dose equivalent coming from a specific Key Facility or technical area can only be estimated. LANL staff report radiation exposure to waste management operations workers as an occupational group through DOE's Radiation Exposure Monitoring System database, but these workers may also perform other functions that do not support waste management activities.

The average measurable dose over the same 6-year period for waste management operations personnel at LANL was 163 millirem. Approximately 20 percent of the waste management operations personnel obtain measurable dose (DOE 2005a). Waste management personnel primarily work in TA-50 and TA-54, but they may also periodically work in other TAs.

LANL staff currently monitor direct radiation (radiation from a source term, which can generally be correlated to an external dose) throughout the LANL site using thermoluminescent detectors. LANL staff report these measurements through the LANL meteorology and air quality web site on a quarterly basis (LANL 2005e). The results include direct radiation contributions from natural background (that is, cosmic and terrestrial radiation). After subtracting out the approximate contribution of natural background radiation, it is found that LANL waste management operations in Area G contribute to direct radiation levels in the work environment outside the transuranic waste storage domes and the Decontamination and Volume Reduction System (direct radiation levels in TA-50 and TA-63 are within background levels) (LANL 2005e). These radiation levels contribute to a radiation dose ranging from 42 to 729 millirem per quarter over the last 10 quarters reported and are a result of gamma and neutron exposures, depending on the location. These exposures reflect a worker who would be outside one of these locations 24 hours per day, 7 days per week (LANL 2005e).

Construction, DD&D and Operational Impacts—As compared to the No Action Option, additional point source radiological impacts can be expected due to the operation of the proposed remote-handled transuranic waste retrieval facility in TA-54 and the proposed Transuranic Waste Consolidation Facility. It is assumed that the remote-handled transuranic waste retrieval facility and the Transuranic Waste Consolidation Facility would be designed such that radiological releases would not exceed the releases that are documented from the Decontamination and Volume Reduction System.[8] The facility-specific maximum exposed individual dose associated with TA-54 from operation of the remote-handled transuranic waste retrieval facility would be the same as from the Decontamination and Volume Reduction System (0.0073 millirem per year) from 2011 to 2015. Both the remote-handled transuranic waste retrieval facility and the Decontamination and Volume Reduction System would cease operations in 2015. The Transuranic Waste Consolidation Facility, located in TA-50 or TA-63, could incur a radiological dose to the facility-specific maximally exposed individual of approximately 0.0018 millirem per year beginning in 2012 and lasting for about 30 years. The facility-specific (TA-50) maximum exposed individual is assumed to be located at the Royal Crest Trailer park. The radiological dose to the facility-specific maximum exposed individual is higher from facilities in TA-54 than TA-50 and TA-63 because TA-54 has a smaller distance to the maximum exposed individual location. The impact of the Transuranic Waste Consolidation Facility, the remote-handled transuranic waste retrieval facility, and the Decontamination and Volume Reduction System on the LANL site-wide MEI (located approximately 800 meters north-northeast of LANSCE in the Expanded Operations Alternative) would be minor (an additional 0.0005 millirem per year) when compared to the dose from operations at LANSCE (7.5 millirem per year). Similarly, these additional waste management operations would add only 0.02 person-rem per year to the total dose (30 person-rem per year) the population would receive from normal operations at LANL under the Expanded Operations Alternative.

The 50-mile population radiological doses for emissions from the remote-handled transuranic waste retrieval facility would also be expected to be similar to the Decontamination and Volume Reduction System (0.0122 person-rem per year) if these facilities are operated in TA-54. If the Transuranic Waste Consolidation Facility is located in TA-50 or TA-63, then the Transuranic Waste Consolidation Facility would contribute approximately 0.00812 person-rem per year to the population, assuming emissions are the same as those from the Decontamination and Volume Reduction System.

Population doses for area emissions at TA-54 were calculated to be 0.025 person-rem per year for the No Action Option. Area emissions should increase due to retrieval and DD&D activities.

In addition, an increase in the area sources related to soil disturbance during waste retrieval from trenches, pits and shafts and DD&D activities would occur. However, these increases would be offset by decreases in direct radiation associated with the transuranic waste stored in the domes as the above-grade waste inventory declines due to processing and shipping this waste to WIPP. It is therefore expected that direct radiation levels in Area G would stay relatively the same as transuranic waste is retrieved from below-ground storage and placed into above-ground storage

[8] *The remote-handled transuranic waste retrieval and processing facility would be processing highly radioactive waste, thus it is conceivable that its emissions could be higher than the Decontamination and Volume Reduction System. LANL staff would prepare a Documented Safety Analysis for this proposed facility to more accurately determine its potential emissions and resulting impacts.*

in the storage domes. Retrieval would only occur as storage space becomes available in the storage domes. Direct radiation levels would ultimately decrease to close to background levels in Area G by 2016 once all transuranic waste is shipped offsite for disposal and DD&D activities are completed. In Area L, direct radiation levels would remain within background levels since mixed low-level radioactive waste storage volumes would not increase over current storage levels.

For the low-level radioactive waste processing facilities to be constructed in Zone 4, it is expected that direct radiation levels and radiological emissions associated with characterization, verification and compaction would remain at current levels since the only change in operations would be that the location of these activities would be different, and the new processing capabilities in Zone 4 would be similar to the current capabilities in Area G.

Worker exposures to direct radiation would be controlled ALARA using engineering design and administrative controls. The LANL performance goal is to maintain a worker's whole body dose to less than 2 rem per year (LANL 2002a). Waste management workers would be expected to maintain current exposure levels because of these administrative controls.

For nonradiological impacts, approximately 3 recordable injuries may occur for performing DD&D activities in TA-54 (which includes Areas L and G) using national safety statistics. These values represent DD&D of all structures and processes; although not all of the structures and processes in Area L would be removed under Option 1, these would represent a small percentage of the overall total and would not appreciably lower the values.

Several facilities would also be constructed in this option. Using safety statistics for LANL, approximately 3 recordable injuries may occur during construction of the low-level radioactive facilities, the Transuranic Waste Consolidation Facility, and the Remote-Handled Transuranic Waste Retrieval Facility.

Note that installation of a new TRUPACT II loading area would result in lower occupational safety impacts than the construction of the other facilities because this loading area would go in an existing fabric dome and would not require significant construction activities. In addition, occupational safety impacts due to moving transuranic waste processing equipment from outdoors to inside one of the fabric domes would be minimal.

Potential impacts from hazardous and toxic chemicals would continue to be prevented through the use of administrative controls and equipment.

Cultural Resources

TA-63 contains two cultural resource sites which have been identified as a wagon road and historic artifact scatter; both are associated with the Homestead Period. The former is eligible for listing on the National Register of Historic Places while the latter is not. Neither site is located adjacent to the proposed site of the Transuranic Waste Consolidation Facility. TA-50 contained one cultural resource site which has been excavated.

Due to its large size, TA-54 has many cultural resource sites; thus, only those resources within the TA that are in the vicinity of Area G and Area L are summarized in this section. There are

22 cultural resource sites near Area G and 10 in the vicinity of Area L and Zone 4. Of the 22 archeological sites located within Area G, 7 have been excavated within the MDA and 1 partially excavated with Zone 4. All identified cultural resource sites are prehistoric and include lithic and ceramic scatters, rock art, rock shelters, cavates, a 1 to 3 room structure, Pueblo roomblocks, and plaza Pueblos. Fourteen sites within the vicinity of Area G have been determined to be eligible for listing on the National Register of Historic Places, while 8 are ineligible. A number of prehistoric sites were located within Area G prior to its development; however, these were examined by archaeologists prior to development of the MDA. All 10 prehistoric sites located within TA-54 in the vicinity of Area L have been determined to be eligible for listing in the National Register of Historic Places. Of the 10 sites located in the vicinity of Area L, 1 has been excavated. Eight archaeological sites are located in Zone 4, which is where low-level radioactive waste disposal operations are being expanded.

Construction, DD&D, and Operations Impacts—Under this option all actions in TA-54, including new construction and removal of the white colored domes, would take place within developed areas. Thus, there would be no direct impact on cultural resources. However, a number of cultural resource sites are located nearby; and, the potential exists for indirect impacts to these resources. In order to ensure these resources would not be affected, cultural resource site boundaries would be marked and fenced, as appropriate, prior to groundbreaking activities. Fencing would prevent accidental intrusion and disturbance to the sites.

For the Transuranic Waste Consolidation Facility, direct impacts to the cultural resources at TA-50 would not occur since the site once located in this TA has been excavated. Direct impacts at TA-63 are unlikely since the location of the Transuranic Consolidation Facility does not coincide with any of the identified cultural resource sites at either TA. Indirect impacts are also unlikely since cultural resources are located at least 600 feet (180 meters) from the potential facility sites.

Adverse impacts on traditional cultural properties from activities associated with the waste management facilities would be unlikely since most activities would take place within previously disturbed portions of TA-50 and TA-54. However, removal of the white-colored fabric domes at TA-54 would have a positive impact on views from Pueblo of San Ildefonso lands which border the TA to the north.

Infrastructure

For the purposes of analyzing the potential infrastructure impacts associated with waste management facilities transition options, it was assumed that planned electrical upgrades for TA-50 would occur regardless of this proposed project.

Construction and DD&D Impacts—Utility resource requirements to support construction of the proposed new waste management facilities are expected to have a minor incremental impact on site utility infrastructure. Approximately 203,000 gallons (768,439 liters) of liquid fuels (diesel and gasoline) would be consumed for site work mainly for use by heavy equipment and 220,000 gallons (832,791 liters) for new facility construction. Liquid fuels would be procured from offsite sources and, therefore, would not be limited resources. In addition, it is anticipated that approximate 2.3 million gallons (9 million liters) of water would be needed for construction, primarily for dust suppression and soil compaction. The existing LANL water supply infrastructure would be easily capable of handling this demand. Electrical and water usage in Area L would slightly decrease due to a decrease in waste management operations.

Operations Impacts—Upon completion, operation of the new waste management facilities for the timeframes required would be expected to have a negligible incremental impact on LANL utility infrastructure. The operation of new low-level radioactive waste processing facilities in Zone 4, TA-54 would offset decreased infrastructure usage gained by the DD&D of the current facilities. The remote-handled transuranic waste retrieval facility and the Transuranic Waste Consolidation Facility do not have energy-intensive operations.

Waste Management

The Solid Radioactive and Chemical Waste Facilities at TA-54 manage a variety of wastes including industrial and toxic wastes, hazardous wastes, low-level radioactive waste, transuranic waste, and mixtures of these wastes. Most of the wastes managed at this Key Facility are generated elsewhere, with waste quantities and associated impacts attributed to the generating facilities. However, the Chemical and Radioactive Waste Management Facilities generate secondary wastes from the treatment, storage, and disposal of chemical and radioactive wastes. Examples of secondary wastes include: repackaging wastes from the visual inspection of transuranic waste, high-efficiency particulate air filters from waste operations, personnel protective clothing and equipment, and process wastes from size reduction and compaction (LANL 2004a). Although operations at this Key Facility include the retrieval of stored legacy transuranic waste, this waste is not included in the waste generation quantities for the Solid Radioactive and Chemical Waste Facilities. Historical chemical and radioactive waste generation information is provided in **Table H–19**.

Table H–19 Waste Generation Ranges and Annual Average Generation Rates for the Solid Radioactive and Chemical Waste Facilities

Waste Type	*Rates for the Period 1999 to 2004*	
Low-level Radioactive Waste (cubic yards)	Range	17 to 267
	Average	72
Mixed Low-level Radioactive Waste (cubic yards)	Range	0 to 0
	Average	0
Transuranic Waste (cubic yards)	Range	0 to 115
	Average	42
Mixed Transuranic Waste (cubic yards)	Range	0 to 77
	Average	21
Chemical Waste (pounds)	Range	66 to 2,638
	Average	1,527

Notes: The Solid Radioactive and Chemical Waste Facilities data was compiled jointly for waste management facilities at both TA-54 and TA-50. Only activities within TA-54 will be affected by the proposed closure of MDA L and MDA G; therefore, the values shown are a conservative estimate of waste management impacts to the affected environment. To convert pounds to kilograms, multiply by 0.45359; cubic yards to cubic meters, multiply by 0.76456.
Sources: LANL 2003a, 2004d, 2005d.

Construction and DD&D Impacts—Construction of new facilities under Option 1 would generate some waste, primarily construction debris and associated solid waste. Construction debris is not hazardous, and is managed at solid waste landfills. Approximately 240 cubic yards (183 cubic meters) of construction debris would be expected from construction activities under Option 1.

A significant quantity of low-level radioactive waste and a small quantity of mixed low-level radioactive waste would be generated by DD&D of the aboveground facilities in Area L and MDA L, and Area G and MDA G, as detailed in **Table H–20**.

Table H–20 Estimated Waste Volumes from Decontamination, Decommissioning and Demolition Activities (cubic yards)

Low Specific Activity Waste	*Packaged Low-level Radioactive Waste*	*Mixed Low-level Radioactive Waste*	*Solid* [a]	*Hazardous*	*Asbestos*
22,594	7,531	8	54,099	62	529

[a] Includes construction, demolition, and sanitary waste.
Notes: It is assumed 25 percent of the low-level radioactive waste volume requires packaging. To convert cubic yards to cubic meters, multiply by 0.76456.

Operations Impacts—Operations under Option 1 would be expected to produce additional quantities of low-level radioactive waste and transuranic waste, including some mixed low-level radioactive waste and mixed transuranic waste. As contact-handled transuranic waste is retrieved from trenches, pits, and shafts, and remote-handled transuranic waste is retrieved from shafts, secondary wastes would be generated through retrieval efforts, characterization, size reduction, and repackaging efforts. Because the retrieval facilities would be newly designed with waste minimization principles applied, some efficiency over past retrieval operations would be expected. Low-level radioactive waste would be disposed onsite or shipped offsite, with the selected disposal path determined based on Zone 4 capacity and disposal priorities. Transuranic wastes would be transported to WIPP for disposal. Solid, hazardous and asbestos wastes would be dispositioned according to current practices. The quantities of secondary wastes to be generated would be expected to be small in comparison to the retrieved waste and to LANL-wide quantities from operations. No significant impacts to the waste management infrastructure would be expected from the additional quantities of secondary wastes generated from the wastes generated under Option 1.

Transportation

Motor vehicles are the primary means of transportation at LANL. Regional transportation route(s) to LANL include: Albuquerque and Santa Fe – Interstate-25 to U.S. 84/285 to New Mexico 502; from Española – New Mexico 30 to New Mexico 502; and from Jemez Springs and western communities – New Mexico 4. Hazardous and radioactive material shipments leave or enter LANL from East Jemez Road to New Mexico 4 to New Mexico 502. Only two major roads, New Mexico 502 and New Mexico 4, access Los Alamos County. Los Alamos County traffic volume on these two segments of highway is primarily associated with LANL activities. Pajarito Road generally bisects the LANL site between New Mexico 4 and Diamond Drive in an east-west presentation. NNSA recently closed Pajarito Road to public use; it is now only used by site personnel for accessing the site from Diamond Drive and White Rock and moving between technical areas.

Table H–21 presents results of traffic surveys performed on Pajarito Road just east of TA-63, which is between TA-50 and TA-54. This location would therefore be representative of the stretch of the road impacted by waste shipment activities for Solid Radioactive and Chemical Waste Management Facilities.

Table H–21 2004 Traffic Counts Along Pajarito Road Immediately East of Technical Area 63

Location	*Average Vehicles per Weekday*	*Average Vehicles per Weekend Day*	*AM Eastbound Peak Vehicles per Hour*	*PM Eastbound Peak Vehicles per Hour*
Pajarito Road immediately east of TA-63	5,758	674	859	825

TA = technical area.
Source: KSL 2004.

As part of current operations, LANL security periodically conducts road closures to allow shipments of transuranic waste to occur between TA-54 and TA-50 (where the Waste Characterization, Reduction, and Repackaging facility is located), between TA-54 Area G and TA-54 West (where the Radioassay and Nondestructive Testing facility is located), and to allow shipment of transuranic waste from production and research and development facilities to TA-54. These road closures are necessary to allow the safe shipment of transuranic waste that has yet to be packaged in U.S. Department of Transportation-approved containers (such as TRUPACT II containers) and to minimize radiation exposure to non-involved workers (that is, those workers traveling on the road but not supporting the waste management shipments). Since Pajarito Road is closed to public access, these road closures primarily impact only onsite workers and operations.

Construction and DD&D Impacts—The construction of the Transuranic Waste Consolidation Facility and remote-handled transuranic waste retrieval facility would slightly increase traffic on Pajarito Road due to shipment of materials and construction equipment to these proposed facilities. This would occur only over a period of a few years (2009 to 2011) until construction is complete. There would not be a noticeable increase in construction workforce traffic because it is assumed that the construction workforce currently onsite on other projects would be sufficient to complete these new waste management facilities. There would not be a significant increase in the operational workforce traffic, as the operators for these two facilities would primarily be drawn from the existing workforce and these facilities would not have large staffing requirements. The construction of the replacement low-level radioactive waste processing facilities in Zone 4 would create temporary, but small increases in construction traffic volume on Pajarito Road. The transportation of DD&D wastes related to some of the facilities in Area L and all of the facilities in Area G would primarily be local and stay within TA-54 for radioactive waste shipments, with additional shipments of rubble and other industrial wastes transported to offsite disposal facilities.

The effects from incident-free transportation of these radioactive wastes for the worker population and the general public are presented as collective dose in person-rem resulting in excess latent cancer fatalities in **Table H–22**. Excess LCFs are the number of cancer fatalities that may be attributable to the proposed project that may occur in the exposed population over the lifetimes of the individuals. If the number of LCFs is less than one, the subject population is not expected to incur any LCFs resulting from the actions being analyzed. The risk for development of excess latent cancer fatalities is highest for workers under the offsite disposition option. This is because the dose is proportional to the duration of transport which in turn is proportional to travel distance. As shown in Table H–22, disposal offsite would lead to a higher dose and risk than disposal onsite.

Table H–22 Incident-Free Transportation Impacts – Waste Management Facility Transition Decontamination, Decommissioning and Demolition Activities

Disposal Option	*Low-level Radiation Waste Disposal Location* [a]	*Crew*		*Public*	
		Collective Dose (person-rem)	*Risk (LCFs)*	*Collective Dose (person-rem)*	*Risk (LCFs)*
Onsite disposal	LANL TA-54	0.02	1×10^{-5}	0.005	3×10^{-6}
Offsite disposal	Nevada Test Site	8	5×10^{-3}	2	1×10^{-3}
	Commercial Facility	8	5×10^{-3}	2	1×10^{-3}

rem = roentgen equivalent man, LCF = latent cancer fatality, TA = technical area.
[a] Transuranic wastes are disposed at WIPP.
Note that the number of shipments is based on DD&D of all above-ground facilities in TA-54, Areas G and L and only includes radioactive waste shipments. For Option 1, a few facilities in Area L would remain, such as the mixed low-level radioactive waste storage dome, some hazardous and chemical waste storage facilities, and administrative facilities, but these remaining facilities do not significantly contribute to the radioactive waste streams for DD&D and the values in this table reasonably reflect potential impacts for Option 1. In Option 2, all above-ground facilities in TA-54, Areas G and L would undergo DD&D.

Table H–23 presents the impacts from traffic and radiological accidents. This table provides population risks in terms of fatalities anticipated due to traffic accidents from both the collision and excess LCFs from exposure to releases of radioactivity. The analyses assumed that all generated wastes would be transported to offsite disposal facilities. The results indicate that no traffic fatalities and no excess LCFs are likely to occur from the activities during DD&D activities in TA-54.

Table H–23 Transportation Accident Impacts – Waste Management Facility Transition Decontamination, Decommissioning and Demolition Activities

Radioactive Waste Disposal Location [a, c]	*Number of Shipments* [b]	*Distance Traveled for All Shipments (million miles)*	*Accident Risks*	
			Radiological (Excess LCFs)	*Traffic (Fatalities)*
LANL TA-54	4,856	1.3	NA [d]	0.02
Nevada Test Site	4,856	5.9	2×10^{-7}	0.06
Commercial Facility	4,856	5.4	2×10^{-7}	0.06

LCF = latent cancer fatality, TA = technical area, NA = not applicable.
[a] All nonradiological wastes would be transported offsite.
[b] 37 percent of shipments are for radioactive wastes, with the remaining 63 percent for industrial, sanitary, asbestos, and hazardous wastes.
[c] Transuranic wastes are disposed at WIPP.
[d] No traffic accident leading to releases of radioactivity for onsite transportation is hypothesized.
Note that the number of shipments is based on DD&D of all above-ground facilities in TA-54 and includes radioactive and non-radioactive waste shipments. For Option 1, a few nonradiological facilities in Area L would remain, along with a small mixed low-level radioactive waste storage area and administrative facilities, but these remaining facilities do not significantly contribute to the radioactive waste streams for DD&D and the values in this table reasonably reflect potential impacts for Option 1. In Option 2, all aboveground facilities in TA-54, Areas G and L would undergo DD&D.
Note: To convert miles to kilometers, multiply by 1.6093.

The above incident-free and accident impacts were derived using the assumptions provided in Appendix K.

Operations Impacts—In Option 1, additional transuranic waste processing capabilities (that is, installation of modular units and additional equipment, and addition of a TRUPACT II loading area) would be installed in Area G to accelerate the offsite shipment of this waste to WIPP. These additions would replace the capabilities currently provided by the Waste Characterization, Reduction, and Repackaging facility in TA-50 and the Radioassay and Nondestructive Testing facility in TA-54 West. In this case, the transportation of transuranic waste to and from TA-50 and TA-54 West would be eliminated, as would the need for closing Pajarito Road to transport transuranic waste to and from the Waste Characterization, Reduction, and Repackaging facility and Radioassay and Nondestructive Testing facility, that would otherwise occur under the No Action Option. Road closures would continue to allow for the shipment of newly-generated transuranic waste from LANL production areas to TA-54 while Area G and MDA G remains open. In Option 1, LANL staff would ship all transuranic waste stored above-ground and below-ground to WIPP. Appendix K addresses the transportation impacts for removal of these wastes.

The Transuranic Waste Consolidation Facility may be located in the TA-50 or TA-63 area. If this occurs, transportation impacts would be smaller than those for No Action for transporting transuranic waste from facilities generating the waste to waste processing facilities since the Transuranic Waste Consolidation Facility would be located closer, or adjacent, to the facilities generating the transuranic waste. This would also mean that road closures to onsite traffic would be reduced or eliminated, and would not occur on Pajarito Road.

Transportation impacts due to use of the new low-level radioactive waste characterization and verification building and compactor building in Zone 4, and continued use of Area L for mixed low-level radioactive waste and hazardous and chemical waste storage would be similar to the impacts related to No Action.

Transportation impacts related to hazardous and chemical waste and mixed low-level radioactive waste storage would be similar to the impacts associated with the No Action Option, as the transportation pattern as currently observed would not significantly change.

Facility Accidents

Three accident scenarios not otherwise considered in this SWEIS could occur in association with proposed waste management facilities transition options.

For Option 1, an accident scenario would be associated with the retrieval of the higher activity remote-handled transuranic waste from shafts 200 - 232 in Area G, which contain 953 cubic feet (27 cubic meters) of this waste in 1-gallon (3.8 liter) cans (LANL 2005b). A remote-handled transuranic waste retrieval facility is proposed to be constructed to allow retrieval of this waste. A bounding accident would be an explosion while retrieving the inventory from a shaft, causing a loss of confinement by the waste facility. Although there is no indication of explosives or chemicals in the shafts which could cause such an explosion, their absence is not completely certain. This scenario is analogous to the explosion during waste removal from MDA-G provided in Appendix I.

The radionuclide inventory of each of the shafts was compared and shafts 205 and 206 were determined to be those which could potentially result in the greatest consequences in the event of an accident. The frequency of occurrence of the accident was estimated to be 1 in 1,000 years. Shaft 206 would result in the largest impacts from inhalation of radionuclide releases based on its transuranic radionuclide inventory, but the external dose to the noninvolved worker (located 110 yards [100 meters] from the source) and to the maximally exposed individual (located at the site boundary) from the mixed fission product inventory in shaft 205 together with internal and external dose from releases from this shaft was also investigated to assure that these consequences were not greater. The accident analysis for this facility therefore separately determined the potential impacts for retrieving waste from shaft 205 and shaft 206.

Also for Option 1, the Transuranic Waste Consolidation Facility, which may be located in either TA-50 or 63, was analyzed for an accident scenario in which a seismic event occurs and the radiological contents released. Such an accident would be equivalent to that analyzed for the Decontamination and Volume Reduction System in its Safety Analysis Report, based on the assumption that the operations at the Transuranic Waste Consolidation Facility would be similar to current operations at the Decontamination and Volume Reduction System.

For Option 2a, it is assumed that complete removal of transuranic waste from TA-54 Area G and shipment to WIPP would not be accomplished on a schedule that would allow closure of Area G and MDA G to occur per the terms of the Consent Order. If this were to occur, two waste storage buildings, equivalent to waste storage domes currently in Area G, could be constructed and co-located with the Transuranic Waste Consolidation Facility. The Transuranic Waste Consolidation Facility may be located in either TA-50 or 63. A site at the intersection of TA-50, TA-63, and Pajarito Road was chosen to represent the location of this new facility in these two adjacent technical areas; the MEI would then be located at the Royal Crest Trailer Park, approximately 4,720 feet (1,440 meters) to the north.

Two analyses were performed which bound the processing and storage of transuranic waste in Option 2a. The first considered a seismic event for which the material at risk would be the entire remote-handled transuranic waste in shafts 200-232. The conservative assumption was made that containers holding the waste would be no stronger than the overpacks used in the present waste storage domes at TA-54, Area G. The Transuranic Waste Consolidation Facility would be designed to withstand an earthquake corresponding to a frequency of occurrence of 5×10^{-4} per year (or 1 chance in 2,000 years). This frequency is conservatively taken as the probability of the seismic event resulting in waste release. This scenario is analogous to the Site-wide Seismic 02 event resulting in a release from the waste storage domes at Area G that is analyzed in Appendix D. The second analysis for Option 2a considered the risk if contact-handled transuranic waste relocated from Area G was stored in the two storage buildings and released because of a seismic event. The material at risk in the two storage buildings was conservatively assumed to be double that of the Area G storage dome with the largest waste inventory.

Table H–24 shows the source information used to calculate impacts to the workers and public from these three additional accident scenarios. **Tables H–25, H–26, and H–27** present the associated impacts.

Table H–24 Alternative Site Seismic Source Terms

Accident Phase	Nuclide	Material at Risk (curies or grams)	Material at Risk	Damage Ratio	Airborne Release Fraction	Respirable Fraction	Airborne Release Rate (per hour)	Leak Path Factor	Source Term (units of MAR)	Release Duration (minutes)	Plume Heat (mega-watts)	Release Height (meters)	Wake?
Scenario Name: Explosion at MDA-G RH-TRU Shaft 205													
Explosion	Cesium-137	curies	113	1	0.001	1	-	1	0.113	1	0	0	N
	Europium-155		0.0719	1	0.001	1	-	1	0.0000719	1	0	0	N
	Promethium-147		0.00595	1	0.001	1	-	1	5.95×10^{-6}	1	0	0	N
	Plutonium-239		7.25	1	0.001	1	-	1	0.00725	1	0	0	N
	Ruthenium-106		3.55×10^{-9}	1	0.001	1	-	1	3.55×10^{-12}	1	0	0	N
	Antimony-125		0.00635	1	0.001	1	-	1	6.35×10^{-6}	1	0	0	N
	Strontium-90		101	1	0.001	1	-	1	0.101	1	0	0	N
	Tellurium-125m		0.00154	1	0.001	1	-	1	1.54×10^{-6}	1	0	0	N
	Uranium-235		0.00085	1	0.001	1	-	1	8.50×10^{-7}	1	0	0	N
	Yttrium-90		100	1	0.001	1	-	1	0.1	1	0	0	N
Suspension	Cesium-137	curies	113	1	-	1	4.00×10^{-6}	1	0.0108	1,440	0	0	N
	Europium-155		0.0718	1	-	1	4.00×10^{-6}	1	6.90×10^{-6}	1,440	0	0	N
	Promethium-147		0.00594	1	-	1	4.00×10^{-6}	1	5.71×10^{-7}	1,440	0	0	N
	Plutonium-239		7.24	1	-	1	4.00×10^{-6}	1	0.000695	1,440	0	0	N
	Ruthenium-106		3.55×10^{-9}	1	-	1	4.00×10^{-6}	1	3.40×10^{-13}	1,440	0	0	N
	Antimony-125		0.00634	1	-	1	4.00×10^{-6}	1	6.09×10^{-7}	1,440	0	0	N
	Strontium-90		101	1	-	1	4.00×10^{-6}	1	0.00969	1,440	0	0	N
	Tellurium-125m		0.00154	1	-	1	4.00×10^{-6}	1	1.48×10^{-7}	1,440	0	0	N
	Uranium-235		0.000849	1	-	1	4.00×10^{-6}	1	8.15×10^{-8}	1,440	0	0	N
	Yttrium-90		99.9	1	-	1	4.00×10^{-6}	1	0.00959	1,440	0	0	N
Scenario Name: Explosion at MDA-G RH-TRU Shaft 206													
Explosion	Cesium-137	curies	49.5	1	0.001	1	-	1	0.0495	1	0	0	N
	Europium-155		0.0353	1	0.001	1	-	1	0.0000353	1	0	0	N
	Promethium-147		0.00331	1	0.001	1	-	1	3.31×10^{-6}	1	0	0	N
	Plutonium-239		17.5	1	0.001	1	-	1	0.0175	1	0	0	N
	Ruthenium-106		3.01×10^{-9}	1	0.001	1	-	1	3.01×10^{-12}	1	0	0	N
	Antimony-125		0.00349	1	0.001	1	-	1	3.49×10^{-6}	1	0	0	N

Accident Phase	Nuclide	Material at Risk (curies or grams)	Material at Risk	Damage Ratio	Airborne Release Fraction	Respirable Fraction	Airborne Release Rate (per hour)	Leak Path Factor	Source Term (units of MAR)	Release Duration (minutes)	Plume Heat (mega-watts)	Release Height (meters)	Wake?
	Strontium-90		44.4	1	0.001	1	-	1	0.0444	1	0	0	N
	Tellurium-125m		0.000844	1	0.001	1	-	1	8.44×10^{-7}	1	0	0	N
	Uranium-235		0.00178	1	0.001	1	-	1	1.78×10^{-6}	1	0	0	N
	Yttrium-90		43.9	1	0.001	1	-	1	0.0439	1	0	0	N
Suspension	Cesium-137	curies	49.5	1	-	1	4.00×10^{-6}	1	0.00475	1,440	0	0	N
	Europium-155		0.0353	1	-	1	4.00×10^{-6}	1	3.39×10^{-6}	1,440	0	0	N
	Promethium-147		0.00331	1	-	1	4.00×10^{-6}	1	3.17×10^{-7}	1,440	0	0	N
	Plutonium-239		17.5	1	-	1	4.00×10^{-6}	1	0.00168	1,440	0	0	N
	Ruthenium-106		3.01×10^{-9}	1	-	1	4.00×10^{-6}	1	2.89×10^{-13}	1,440	0	0	N
	Antimony-125		0.00349	1	-	1	4.00×10^{-6}	1	3.35×10^{-7}	1,440	0	0	N
	Strontium-90		44.4	1	-	1	4.00×10^{-6}	1	0.00426	1,440	0	0	N
	Tellurium-125m		0.000843	1	-	1	4.00×10^{-6}	1	8.09×10^{-8}	1,440	0	0	N
	Uranium-235		0.00178	1	-	1	4.00×10^{-6}	1	1.71×10^{-7}	1,440	0	0	N
	Yttrium-90		43.9	1	-	1	4.00×10^{-6}	1	0.00421	1,440	0	0	N
Scenario Name: Seismic Event Releasing Entire RH-TRU Inventory from Two Storage Buildings at Transuranic Waste Consolidation Facility Location													
Initial Impact	Americium-241	curies	1.82	0.167	0.001	0.3	-	1	0.0000910	10	0	0	N
	Cobalt-60		0.661	0.167	0.001	0.3	-	1	0.0000331	10	0	0	N
	Cesium-137		508	0.167	0.001	0.3	-	1	0.0254	10	0	0	N
	Europium-155		0.392	0.167	0.001	0.3	-	1	0.0000196	10	0	0	N
	Promethium-147		0.0416	0.167	0.001	0.3	-	1	2.08×10^{-6}	10	0	0	N
	Plutonium-238		1.29	0.167	0.001	0.3	-	1	0.0000645	10	0	0	N
	Plutonium-239		77.6	0.167	0.001	0.3	-	1	0.00388	10	0	0	N
	Plutonium-240		2.42	0.167	0.001	0.3	-	1	0.000121	10	0	0	N
	Plutonium-241		29.4	0.167	0.001	0.3	-	1	0.00147	10	0	0	N
	Plutonium-242		0.00146	0.167	0.001	0.3	-	1	7.30×10^{-8}	10	0	0	N
	Ruthenium-106		7.57×10^{-8}	0.167	0.001	0.3	-	1	3.79×10^{-12}	10	0	0	N
	Antimony-125		0.043	0.167	0.001	0.3	-	1	2.15×10^{-6}	10	0	0	N
	Strontium-90		455	0.167	0.001	0.3	-	1	0.0228	10	0	0	N
	Tellurium-125m		0.0104	0.167	0.001	0.3	-	1	5.20×10^{-7}	10	0	0	N

Accident Phase	*Nuclide*	*Material at Risk (curies or grams)*	*Material at Risk*	*Damage Ratio*	*Airborne Release Fraction*	*Respirable Fraction*	*Airborne Release Rate (per hour)*	*Leak Path Factor*	*Source Term (units of MAR)*	*Release Duration (minutes)*	*Plume Heat (mega-watts)*	*Release Height (meters)*	*Wake?*
	Uranium-234		0.000761	0.167	0.001	0.3	-	1	3.81×10^{-8}	10	0	0	N
	Uranium-235		0.00859	0.167	0.001	0.3	-	1	4.30×10^{-7}	10	0	0	N
	Uranium-236		2.76×10^{-6}	0.167	0.001	0.3	-	1	1.38×10^{-10}	10	0	0	N
	Uranium-238		0.0000401	0.167	0.001	0.3	-	1	2.01×10^{-9}	10	0	0	N
	Yttrium-90		450	0.167	0.001	0.3	-	1	0.0225	10	0	0	N
Suspension	Americium-241	curies	1.82	1	-	1	4.00×10^{-6}	1	0.000175	1,440	0	0	N
	Cobalt-60		0.661	1	-	1	4.00×10^{-6}	1	0.0000635	1,440	0	0	N
	Cesium-137		508	1	-	1	4.00×10^{-6}	1	0.0488	1,440	0	0	N
	Europium-155		0.392	1	-	1	4.00×10^{-6}	1	0.0000376	1,440	0	0	N
	Promethium-147		0.0416	1	-	1	4.00×10^{-6}	1	3.99×10^{-6}	1,440	0	0	N
	Plutonium-238		1.29	1	-	1	4.00×10^{-6}	1	0.000124	1,440	0	0	N
	Plutonium-239		77.6	1	-	1	4.00×10^{-6}	1	0.00745	1,440	0	0	N
	Plutonium-240		2.42	1	-	1	4.00×10^{-6}	1	0.000232	1,440	0	0	N
	Plutonium-241		29.4	1	-	1	4.00×10^{-6}	1	0.00282	1,440	0	0	N
	Plutonium-242		0.00146	1	-	1	4.00×10^{-6}	1	1.40×10^{-7}	1,440	0	0	N
	Ruthenium-106		7.57×10^{-8}	1	-	1	4.00×10^{-6}	1	7.27×10^{-12}	1,440	0	0	N
	Antimony-125		0.0430	1	-	1	4.00×10^{-6}	1	4.13×10^{-6}	1,440	0	0	N
	Strontium-90		455	1	-	1	4.00×10^{-6}	1	0.0437	1,440	0	0	N
	Tellurium-125m		0.0104	1	-	1	4.00×10^{-6}	1	9.98×10^{-7}	1,440	0	0	N
	Uranium-234		0.000761	1	-	1	4.00×10^{-6}	1	7.31×10^{-8}	1,440	0	0	N
	Uranium-235		0.00859	1	-	1	4.00×10^{-6}	1	8.25×10^{-7}	1,440	0	0	N
	Uranium-236		2.76×10^{-6}	1	-	1	4.00×10^{-6}	1	2.65×10^{-10}	1,440	0	0	N
	Uranium-238		0.0000401	1	-	1	4.00×10^{-6}	1	3.85×10^{-9}	1,440	0	0	N
	Yttrium-90		450	1	-	1	4.00×10^{-6}	1	0.0432	1,440	0	0	N
Scenario Name: Seismic Event Releasing CH-TRU from Two Storage Buildings at the Transuranic Waste Consolidation Facility Location													
Initial Impact Combustibles													
Drums	Plutonium Equivalent	curies	11,854	0.333	0.001	0.3	-	1	1.19	10	0	0	N
Overpacks			5,202	0.167	0.001	0.3	-	1	0.260	10	0	0	N

Accident Phase	Nuclide	Material at Risk (curies or grams)	Material at Risk	Damage Ratio	Airborne Release Fraction	Respirable Fraction	Airborne Release Rate (per hour)	Leak Path Factor	Source Term (units of MAR)	Release Duration (minutes)	Plume Heat (mega-watts)	Release Height (meters)	Wake?
Initial Impact Non-combustibles													
Drums	Plutonium Equivalent	curies	35,660	0.333	0.000849	0.3	-	1	3.03	10	0	0	N
Overpacks			15,650	0.167	0.000762	0.3	-	1	0.596	10	0	0	N
Suspension													
Combustibles	Plutonium Equivalent	curies	4,814	1	-	1	4.00×10^{-6}	1	0.462	1,440	0	0	N
Non-combustibles			12,071	1	-	1	4.00×10^{-6}	1	1.16	1,440	0	0	N
Total													
Initial Impact	Plutonium Equivalent	curies	-	-	-	-	-	-	5.07	10	0	0	N
Suspension			-	-	-	-	-	-	1.62	1,440	0	0	N
Scenario Name: Seismic Event Releasing TRU from the Transuranic Waste Consolidation Facility Assuming Equivalent to DVRS Operations													
PC-3 Seismic	Plutonium Equivalent	curies	1,100	1	0.001	1	-	1	1.1	1,440	0	0	N

MAR = materials at risk, MDA = material disposal area, RH-TRU = remote-handled transuranic, N = no, CH-TRU = contact-handled transuranic, DVRS = Decontamination and Volume Reduction System.

Table H–25 Alternative Site Seismic Radiological Accident Consequences

Accident Scenario	Maximally Exposed Individual		Population to 50 miles	
	Dose (rem)	Latent Cancer Fatality [a]	Dose (person-rem)	Latent Cancer Fatalities [b, c]
Explosion at MDA-G RH-TRU Shaft 205	0.325	0.000195	13.5	0.0081
Explosion at MDA-G RH-TRU Shaft 206	0.747	0.000448	14.5	0.0087
Seismic Event Releasing Entire RH-TRU Inventory from Two Storage Buildings at Transuranic Waste Consolidation Facility Location	0.0378	0.0000227	11.5	0.0069
Seismic Event Releasing Transuranic Waste from the Transuranic Waste Consolidation Facility Assuming Equivalent to DVRS Operations	2.13	0.00128	600	0.360
Seismic Event Releasing CH-TRU from Two Storage Buildings at the Transuranic Waste Consolidation Facility Location	28.8	0.0346	3700	2.22

rem = roentgen equivalent man, MDA = material disposal area, RH-TRU = remote-handled transuranic, DVRS = Decontamination and Volume Reduction System, CH-TRU = contact-handled transuranic.

[a] Increased risk of a latent cancer fatality to an individual, assuming the accident occurs.

[b] Increased number of latent cancer fatalities for the population, assuming the accident occurs.

[c] Offsite population size out to a 50-mile radius is approximately 302,000 (TWCF), 343,000 (MDA-G).

Table H–26 Alternative Site Seismic Radiological Accident Onsite Worker Consequences

Accident Scenario	Non-involved Worker (at 100 meters)	
	Dose (rem)	Latent Cancer Fatality [a]
Explosion at MDA-G RH-TRU Shaft 205	2.38	0.00143
Explosion at MDA-G RH-TRU Shaft 206	5.48	0.00329
Seismic Event Releasing Entire RH-TRU Inventory from Two Storage Buildings at Transuranic Waste Consolidation Facility Location	2.37	0.00142
Seismic Event Releasing Transuranic Waste from the Transuranic Waste Consolidation Facility Assuming Equivalent to DVRS Operations	132	0.158
Seismic Event Releasing CH-TRU from Two Storage Buildings at the Transuranic Waste Consolidation Facility Location	1820	2.18

rem = roentgen equivalent man, MDA = material disposal area, RH-TRU = remote-handled transuranic, DVRS = Decontamination and Volume Reduction System, CH-TRU = contact-handled transuranic.

[a] Increased risk of latent cancer fatality to an individual, assuming the accident occurs.

Table H–27 Alternative Site Radiological Accident Offsite Population and Worker Risks

Accident Scenario	Onsite Worker	Offsite Population	
	Non-involved Worker (at 100 meters) [a]	Maximally Exposed Individual [a]	Population to 50 Miles [b, c]
Explosion at MDA-G RH-TRU Shaft 205	1.43×10^{-6}	1.95×10^{-7}	8.10×10^{-6}
Explosion at MDA-G RH-TRU Shaft 206	3.29×10^{-6}	4.48×10^{-7}	8.70×10^{-6}
Seismic Event Releasing Entire RH-TRU Inventory from Two Storage Buildings at Transuranic Waste Consolidation Facility Location	7.11×10^{-7}	1.13×10^{-8}	3.45×10^{-6}
Seismic Event Releasing Transuranic Waste from the Transuranic Waste Consolidation Facility Assuming Equivalent to DVRS Operations	0.0000792	6.39×10^{-7}	0.000180
Seismic Event Releasing CH-TRU from Two Storage Buildings at the Transuranic Waste Consolidation Facility Location	0.00109	0.0000173	0.00111

MDA = material disposal area, RH-TRU = remote-handled transuranic, DVRS = Decontamination and Volume Reduction System, CH-TRU = contact-handled transuranic.
[a] Increased risk of a latent cancer fatality to an individual per year.
[b] Increased number of latent cancer fatalities for the population per year.
[c] Offsite population size out to a 50-mile radius is approximately 302,000 (TWCF), 343,000 (MDA-G).

Based on Table H–27, impacts from an accident involving an explosion at the remote-handled transuranic waste retrieval facility was verified to be higher for shaft 206 than shaft 205, although they are on the same order of magnitude. For Option 2a, the impacts from the accidental release of remote-handled transuranic waste from the Transuranic Waste Consolidation Facility are less than those that would result from the release of contact-handled transuranic waste from the Transuranic Waste Consolidation Facility. The impacts from the latter are less than those that could occur at TA-54 from current operations. The population dose is approximately one-half that at TA-54 from current operations, mainly as a result of locating only two domes at the alternative location versus the eleven domes at TA-54. The MEI dose decreases by an order of magnitude, chiefly as result of the greater distance to this receptor plus the decrease in dome inventory. The non-involved worker dose is roughly the same at the two sites, reflecting the different meteorological data stations used (TA-6 met tower for the alternative site, TA-54 met tower at TA-54) and the smaller dome inventory.

These accident scenarios bound those that would be associated with other operation options. Leaving remote-handled transuranic waste in place in the shafts (Option 2b) could have a scenario similar to the retrieval explosion scenario analyzed, but would not be associated with a storage scenario described above.

H.3.3.3 Option 2: Interim Actions Necessary for Meeting Consent Order and Other Alternatives

Land Resources

Land Use

As is the case for Option 1, actions taking place under this option within TA-54 would be within disturbed areas. Options 2a and 2b would require the construction of two storage buildings for legacy transuranic waste currently stored in Area G but which needs to be relocated. The two additional storage buildings could be co-located with the Transuranic Waste Consolidation Facility or be separate from it, but at one of the same locations being considered for the Transuranic Waste Consolidation Facility. In Option 2c, mixed low-level radioactive waste and hazardous and chemical waste storage would also be provided at the Transuranic Waste Consolidation Facility. Providing additional transuranic waste storage space would not result in a meaningful change to impacts described in Option 1 since land use designations would not change. Additional facilities that would be closed in Area L (that would not otherwise be closed in Option 1) are located in previously disturbed areas, therefore impacts to land use would be minimal.

Visual Environment

In addition to the processes and facilities constructed as part of Option 1, the two transuranic waste storage buildings proposed in Options 2a and 2b that would store legacy transuranic waste would cause varying visual impacts, depending upon the specific location chosen. Construction of the new storage buildings within a developed area north of Pajarito Road would result in minimal impacts to visual resources. However, if built south of Pajarito Road, the buildings would alter the current open view. NNSA would mitigate the visual impacts from these storage buildings during their design by taking into consideration visual impacts previously created by the use of white-colored fabric domes in Area G and following the design principles provided in the LANL architectural guide (LANL 2002b).

For Option 2b, since the high activity transuranic waste would be left in the shafts, no change to visual impacts would occur in TA-54 since the remote-handled transuranic waste retrieval facility would not be constructed.

Proposed hazardous and chemical waste management activities to be added to the proposed Transuranic Waste Consolidation Facility in Option 2c would have the same visual impacts as those for Option 1, except that all above-ground facilities in Area L would be removed, potentially creating a positive local visual impact.

Geology and Soils

Construction, Operations, and DD&D Impacts—Impacts on geology and soils and impacts due to the consumption of geologic resources under Option 2 would generally be similar to but greater than those described under Option 1. In Option 2a, two additional transuranic waste storage buildings would be constructed in previously disturbed areas, requiring an additional

89,000 cubic yards (68,000 cubic meters) of earthwork over Option 1. In Option 2b, the additional transuranic waste storage buildings would be constructed, but the remote-handled transuranic waste retrieval and processing facility would not be constructed, resulting in an additional 82,000 cubic yards (63,000 cubic meters) of earthwork. In Option 2c, the addition to the Transuranic Waste Consolidation Facility of additional storage space for mixed low-level radioactive waste and hazardous and chemical waste would require minimal earthmoving impacts.

Geologic resource consumption would be negligible to small under this option and would not be expected to deplete local sources or stockpiles of required materials. Approximately 5,500 cubic yards (4,205 cubic meters) of additional concrete including associated aggregate (sand and gravel) and Portland cement would be needed during construction, as compared to Option 1. Component aggregate resources are readily available from onsite borrow areas and otherwise abundant in Los Alamos County, with the required concrete expected to be procured via an off-site supplier.

As detailed under Option 1, all proposed new facilities under Option 2 would be designed, constructed, and operated in compliance with the applicable DOE Orders, requirements, and governing standards that have been established to protect public and worker health and the environment. In addition, construction would use best management practices to minimize process impacts to soils and the surrounding environment.

Following the completion of Option 2, operations would not result in additional impacts on geologic and soil resources at LANL. As discussed above, new facilities would be evaluated, designed, and constructed in accordance with DOE Order 420.1A (DOE 2002b) and other governing DOE and LANL construction standards and sited to minimize the risk from geologic hazards, including earthquakes.

Water Resources

Construction Impacts—In Option 2a, construction of two storage buildings to store transuranic waste would require a construction stormwater pollution prevention plan. The construction stormwater controls would augment the existing industrial stormwater pollution prevention plan controls. In Option 2b, construction of any additional covers or other closure actions required to secure the remote-handled transuranic waste that remains in the shafts would require a construction stormwater pollution prevention plan. The construction stormwater controls would augment the existing industrial stormwater pollution prevention plan controls at TA-54. There would be no impacts on surface water for pursuing alternate permitting options for hazardous waste storage in Option 2c.

Operations Impacts—The proposed two transuranic waste storage facilities in Option 2a would have engineered features to minimize the potential for any liquid release from the transuranic waste storage activities. If remote-handled transuranic waste remains in the storage shafts in Area G and MDA G as proposed in Option 2b, then maintenance and regular inspection of any closure cover to ensure site stabilization would protect surface water from potential contamination. Post-closure care provisions would be included in the site's closure or remedial action plan. All staging areas used to store waste at sites other than TA-54 would need to be added to the Multi-Sector General Permit and would require an individual industrial stormwater pollution prevention plan for a hazardous waste storage facility or would need to be added to the TA-54 industrial stormwater pollution prevention plan as an auxiliary site. These sites would need to create spill and leak procedures and maintenance procedures, and begin stormwater monitoring for specific contaminants. Option 2c, which would relocate hazardous and mixed low-level radioactive waste storage operations from Area L to the proposed Transuranic Waste Consolidation Facility, would also require this facility to be added to the Multi-Sector General Permit and have an individual stormwater pollution prevention plan.

For groundwater, the observations and considerations described for Option 1 are also relevant to Option 2. Contaminant transport rates in the vadose zone overall are unlikely to change during the SWEIS timeframe, nor will groundwater resources be affected over this period. Appropriately designed and constructed covers should eliminate any increased infiltration resulting from construction, DD&D, and operations activities.

Air Quality and Noise

Construction and DD&D Impacts—Similar to Option 1, construction of new waste processing facilities under Option 2 (that is, the legacy transuranic waste storage buildings) would result in temporary increases in air quality impacts from construction equipment, trucks, and employee vehicles. Impacts would be similar to those described in Option 1, as would the impacts related to DD&D activities.

Operations Impacts—During operations, impacts due to toxic air pollutants would be expected to be small and below the screening level emission values and it is expected that the air quality impacts on the public would be minor. Noise impacts for Option 2 are expected to be similar to impacts for Option 1.

Ecological Resources

Construction, Operations, and DD&D Impacts—Impacts to ecological resources under Option 2 would be similar to those described for Option 1 since similar actions would be taken within the same TAs. Providing additional storage space for legacy transuranic waste using two new buildings would not result in a meaningful change to these impacts, although the land requirement would be approximately 2.25 acres (0.9 hectare). The new storage areas would not adversely affect ecological resources since they would be located adjacent to existing structures and processes.

Human Health

Construction, Operations, and DD&D Impacts—In Option 2, all facilities in Area L and Area G would undergo DD&D. The occupational safety information presented for Option 1 would be applicable to Option 2.

For construction, the structures and processes proposed in Option 1 would still be constructed (except for the remote-handled transuranic waste retrieval facility in Option 2b). In addition, two storage buildings of approximately 30,000 square feet (2,787 square meters) each would be constructed to store transuranic waste from Area G. Approximately 3 recordable injuries could occur, based on available statistics.

Potential impacts from hazardous and toxic chemicals would continue to be prevented through the use of administrative controls and equipment while there would continue to be no impacts related to biological agents.

The dose to the maximum exposed individual and the population would be similar to that for Option 1. For Option 2a, the radiological impacts from the proposed remote-handled transuranic waste retrieval facility and the Transuranic Waste Consolidation Facility would be the same as the impacts stated in Option 1. Radiological emissions related to the two proposed storage buildings would be considered “insignificant relative to other sources at LANL,” which is a similar determination to that of the Waste Characterization, Reduction, and Repackaging facility where characterization and packaging activities occur.

For Option 2b, the remote-handled transuranic waste retrieval facility would not be constructed and operated, therefore there would be no radiological dose to workers or the public related to retrieving the higher activity remote-handled transuranic waste from shafts 200-232. Overall, the area source term would be similar to Option 1, because some retrieval activities, and all DD&D activities, would still occur.

For Option 2c, direct radiation levels in Area L would remain within background levels since mixed low-level radioactive waste storage operations would be removed from Area L.

Worker exposures to direct radiation would be controlled ALARA using engineering design and administrative controls. The LANL performance goal is to maintain a worker’s whole body dose to less than 2 rem per year (LANL 2002a).

Cultural Resources

Construction, Operations, and DD&D Impacts—Impacts to cultural resources under Option 2 would be similar to those described for Option 1 since similar actions would be taken within the same TAs. Providing additional storage space for legacy transuranic waste would not result in a meaningful change to these impacts. Although the land requirement would increase to 2.25 acres (0.9 hectares), construction activities would not directly impact cultural resources. The upgraded storage areas would not adversely affect cultural resources since they would be located adjacent to existing structures and processes.

Infrastructure

Construction and DD&D Impacts—Utility resource requirements to support construction of the proposed new waste management facilities under Option 2 would be about two times greater than those described under Option 1. Electrical energy demands for new facility construction are projected to total about 235 megawatt-hours. Approximately 429,000 gallons (1.6 million liters) of liquid fuels (diesel and gasoline) would be consumed for site work mainly for use by heavy equipment and 466,000 gallons (1.7 million liters) for new facility construction. Liquid fuels would be procured from offsite sources and, therefore, would not be limited resources. In addition, it is anticipated that approximate 4.9 million gallons (18.5 million liters) of water would be needed for construction mainly for dust suppression and soil compaction. The existing LANL water supply infrastructure would still be easily capable of handling this demand.

Operations Impacts—Upon completion, operation of the new waste management facilities for the timeframes required would be expected to have a negligible incremental impact on LANL utility infrastructure.

Waste Management

Construction, and DD&D Impacts—Under Option 2, a similar level of impacts associated with construction and DD&D would occur as under Option 1. New buildings would be constructed to retrieve and process waste and older buildings would be demolished to allow remediation activities to take place. Some additional construction (an additional 260 cubic yards [200 cubic meters]) of waste storage units may be necessary, depending upon the sub-option considered. The types and quantities of waste generated by construction and DD&D would be within the capacity of the LANL waste management infrastructure and mainly disposed offsite.

Operations Impacts—Under Option 2, the same level of impacts associated with operational wastes would occur as under the Option 1. Some wastes may be stored longer, but operational impacts associated with the longer storage periods would be small. Operations, including remote-handled transuranic waste management activities, may be consolidated within the new Transuranic Waste Consolidation Facility, to be located outside Area G. The types and quantities of wastes generated would be the same as those generated under Option 1.

Transportation

Construction and DD&D Impacts—In this option, two transuranic waste storage buildings would be constructed in a location other than Area G to store legacy transuranic waste currently in underground facilities in Area G. Similar construction impacts to Option 1 would occur.

Operations Impacts—Operation of two new transuranic waste storage buildings would require more shipments of transuranic waste on Pajarito Road than what would occur under Option 1 or the No Action Option. If the two transuranic waste storage buildings are not co-located with the proposed Transuranic Waste Consolidation Facility, then additional shipments would need to occur to move the transuranic waste from the storage buildings to the Transuranic Waste Consolidation Facility for processing and eventual shipment to a disposal facility. The number of shipments from Area G to the two storage buildings would be large and accompanying road closures would occur. Radiological doses to the workers would be monitored and administratively controlled as currently required.

Transportation impacts related to hazardous and chemical waste and mixed low-level radioactive waste storage would be similar to the impacts associated with the No Action Option, as the transportation pattern as currently observed would not significantly change.

Accidents

In Option 2a, an accident scenario would involve a fire that would cause the release of all of the contents in the two transuranic waste storage buildings that would be constructed to store transuranic waste that could not be shipped for disposal in a timely manner that would allow closure activities in Area G and MDA G to be completed. These two storage buildings would be located in the TA-50 or TA-63 areas. The accident results presented for Option 1 are applicable to this option.

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